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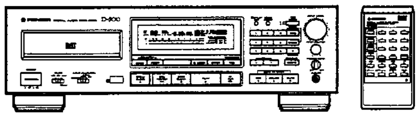
3584

Service Manual



SERVICE GUIDE
ORDER NO.
ARP2338

DIGITAL AUDIO TAPE DECK

D-500

- **Refer to the service manual ARP2336, D – 500/HEM type.**

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1. DAT FORMAT

The standard mechanical system of DAT (digital audio tape deck) is a helical scan system that winds tape over a 30-millimeter diameter drum at a 90-degree angle. Two heads on the drum have azimuth angles of ±20 degrees. Therefore, these heads are aligned obliquely (6 degrees 22 minutes) versus the track on the tape without a guard band as shown in Fig. 2.

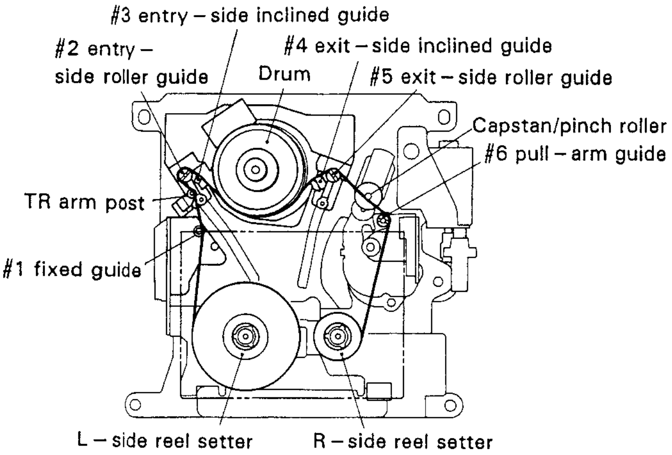

#3 entry – side inclined guide
#2 entry – side roller guide
#4 exit – side inclined guide
Drum
#5 exit – side roller guide
Capstan/pinch roller
#6 pull – arm guide
TR arm post
#1 fixed guide
L – side reel setter
R – side reel setter

Fig. 1 DAT Tape Motion Diagram

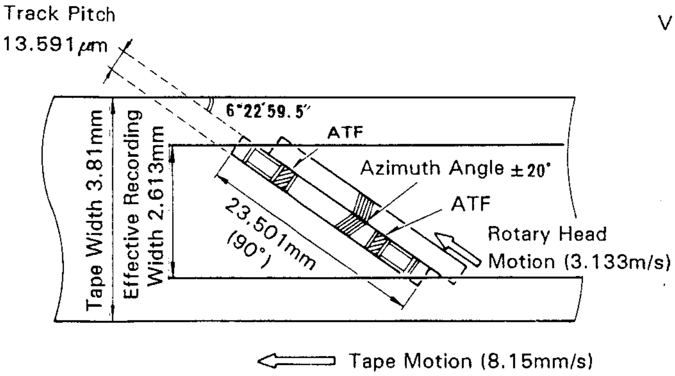

Track Pitch
13.591μm
6°22′59.5″
ATF
Azimuth Angle ±20°
ATF
Rotary Head Motion (3.133m/s)
23.501mm (90°)
Tape Width 3.81mm
Effective Recording Width 2.613mm
Tape Motion (8.15mm/s)

Fig. 2 DAT Tape Format

DAT employ the following new features which household videotape recorders lack.

(1) Tape wrap angle of 90 degrees.

(2) Tracking servo during playback is ATF (ATF pilot signal exists only before and after tracks).

(3) The erasing head records a completely new signal and erases the old signal.

A wrap angle of 90 degrees versus the drum means that the two heads only make contact with the tape at 90-degree intervals during one rotation of the drum. Therefore, the playback RF waveform is not continuous like the waveform of a VTR and becomes intermittent (see Fig. 3).

Consequently, RAM is used as a data processor because compression of the time base is necessary during recording, while expansion of the time base is required during playback. DAT has four modes that can record and playback. The standard mode has a sampling frequency of 48kHz, quantization law coding of 16 bits, and a tape speed of 8.15 millimeters per second. Additionally, there are two playback modes dedicated to the playback of prerecorded tapes. The difference in these two modes lies in the track pitch. The normal track mode has the same width as the record and playback modes, while the wide track mode has 1.5 times the width of normal track mode.

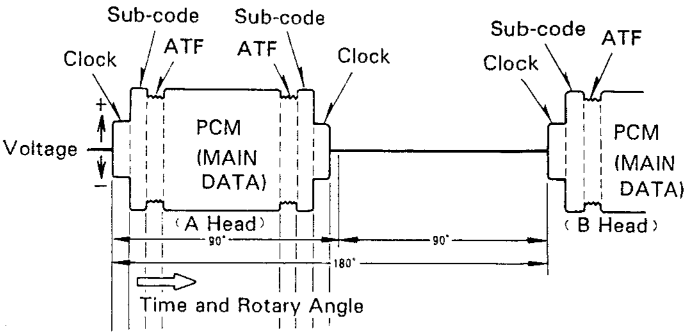

Sub-code
Sub-code
Sub-code
Clock
ATF
ATF
Clock
Clock
ATF
+
Voltage
–
PCM (MAIN DATA)
(A Head)
PCM (MAIN DATA)
(B Head)
90°
90°
180°
Time and Rotary Angle

Fig. 3 RF Signal (Play Back)

1.1 SAMPLING FREQUENCIES

The sampling frequencies included are 48kHz, 44.1kHz, and 32kHz. The standard sampling frequency is 48kHz, and 44.1kHz is used for soft tapes and CD digital recordings.
A sampling frequency of 32kHz is used for options, and there are three modes. Option 1 only changes the sampling frequency from 48kHz to 32kHz, and is generally used for satellite broadcasts. Option 2 uses 12-bit nonlinear quantization to achieve a transmission rate that is half that of the standard mode. The recording time is doubled because the tape feed rate is halved. Option 3 allows 4-channel recording with a sampling frequency of 32kHz (see Fig. 1-1).

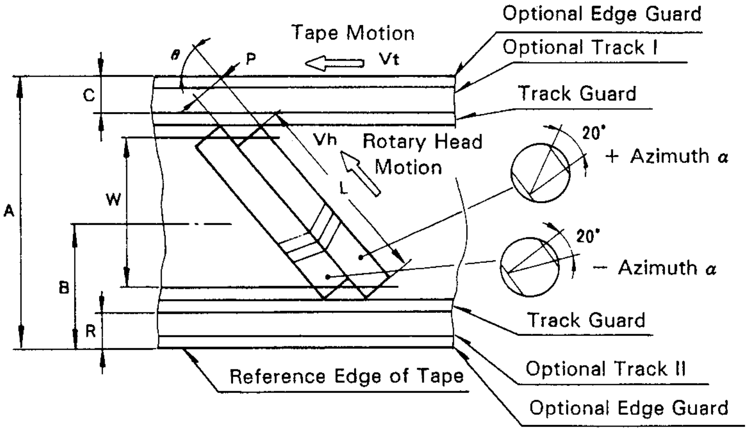
1.2 TAPE FORMAT

The tracks of digital audio tape are closely aligned without any space between tracks. This arrangement is known as "guard band-less" recording. Short tape naturally allows recording of many signals. Additionally, cross talk will occur if this problem is not addressed because neighboring tracks are traced, and noise adulterates the tracks.

The "azimuth system" is used as a method to prevent noise from contaminating the signal when cross talk occurs. Conventional audio recorders also drop the high frequency signals during playback if the azimuth angle is distorted, and the high tones are lost.
Digital audio tape uses this principle in reverse to eliminate cross talk from neighboring tracks. The A head is installed at + azimuth α from the track perpendicular, while the B head is installed at − azimuth α from the track perpendicular. Therefore, signals that have a slope of $\pm\alpha$ versus the tracks on the tape are recorded alternately as shown in Fig. 1-2-1. The A head traces the recorded track during playback, and the tape is correctly played back including the high frequency range when the azimuth error is zero. However, a slope of 2α results between the recording pattern and the playback head if part of the A head is caught by track B. Therefore, the high frequency signal is cancelled and cross talk does not occur. The data format that performs the above functions is indicated in Fig. 1-2-1 and Fig. 1-2-2.

MODE	Normal Track					Wide Track
ITEMS	Mandatory	Option-1	Option-2	Option-3	Start Tapes & Digital Rec. only	Start Track
Number of channels (CH)	2	2	2	4	2	2
Sampling Frequency (kHz)	48	32	32	32	44.1	
Quantization Law Coding (bit)	16 (Linear)	16 (Linear)	12 (Non Linear)	12 (Non Linear)	16 (Linear)	16 (Linear)
Linear Recording Density (KBPI)	61.0	61.0			61.0	61.0
Packing Density (MBPI²)	114	114			114	76
Transmission Rate (MBPS)	2.46	2.46	1.23	2.46	2.46	
Sub-coding (Capacity)(KBPS)	273.1	273.1	136.5	273.1	273.1	
Modulation Scheme	8-10					
Error Correction Code	Doubly encoded RSC					
Tracking Method	Area divided ATF					
Cassette Size (mm)	73 × 54 × 10.5					
Maximum Recording Time (Tape thickness 13μm)(MIN)	120	120	240	120	120	80

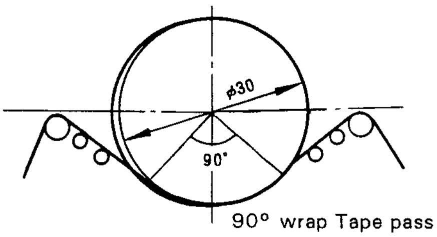
Fig. 1-1 Basic Parameters of R-DAT Format


Optional Edge Guard
Optional Track I
Tape Motion
Vt
θ
P
C
Track Guard
Vh
Rotary Head Motion
L
20°
+ Azimuth α
A
W
20°
− Azimuth α
B
R
Track Guard
Reference Edge of Tape
Optional Track II
Optional Edge Guard

Track Configuration and Dimensions
(View on magnetic sensitive side)

MODE / ITEMS	Mandatory	Option-1	Option-2	Option-3	PRE-RECORDED TAPE	
					Normal Track	Wide Track
(A) Tape width [mm]	3.81 (+0, −0.02)				3.81 (+0, −0.02)	
(W) Effective recording width [mm]	2.613				2.613	
(Vt) Tape speed [mm/sec]	8.15	8.15	4.075	8.15	8.15	12.225
	±0.5%					
(L) Track length [mm]	23.501				23.501	23.171
(P) Track pitch [μm]	13.591				13.591	20.41
(θ) Track angle (Tape runs) [deg]	6° 22′ 59.5″				6° 22′ 59.5″	6° 23′ 29.4″
(a) Head gap azimuth angle [deg]	±20				±20	
(B) Center of track [mm]	1.905				1.905	
(C) Optional track I [mm] (Including optional edge guard (0.1))	0.5				0.5	
(R) Optional track II [mm] (Including optional edge guard (0.1))	0.5				0.5	

Fig. 1－2－1 Tape Format (1)


φ30
90°
90° wrap Tape pass

Rotary Head system Tape pass

MODE / Recommended Cylinder Specifications	Mandatory	Option-1	Option-2	Option-3	PRE-RECORDED TAPE	
					Normal Track	Wide Track
(ϕ) Drum diameter [mm]	30.0				30.0	
(H) Drum revolution speed [mm]	2000		1000	2000	2000	
(Vh) Writing speed [m/S]	3.133		1.567	3.133	3.133	3.129
(ϕ) Wrap angle [deg]	90.0				90.0	
(θ) Track angle [deg]	6° 22′				6° 22′	

Fig. 1－2－2 Tape Format (2)

1.3 TRACK FORMAT

The following three major areas are included on one track.

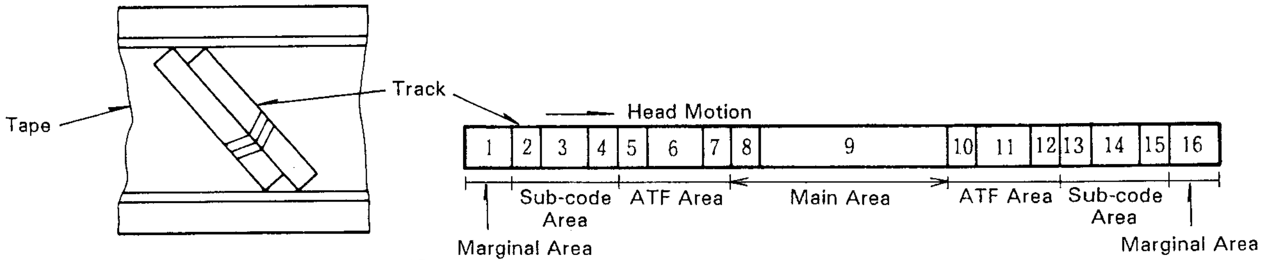
(1) Main area for recording the Main audio data and parities for error correction

(2) ATF servo area for the head to correctly trace the track during playback

(3) Sub-code area for index, program no., and other sub-code recording

One track can be divided into 196 blocks. The necessary block count is assigned to separate the above three areas.

The track format is shown in Fig. 1-3-1. The Main data is sandwiched between two ATF (Automatic Track Finding) areas provided for tracking. Additionally, sub-code areas that can record the recorded tune order, time code, and other data are included on both sides. A margin of approximately 5 percent is provided on both edges of the track to make the total wrap angle of the drum 90 degrees. The ATF areas on wide tracks are slightly wider. The wider ATF areas are suited to the tracking of wide tracks and are interchangeable with normal tracks during operation. Inter Block Gaps (IBG) are provided between signals, and each area can be changed independently by overwriting.



Linear recording density : 61.0 KBPI
fch : 9.408 MHz
Track format : Drum 30φ, Wrap angle 90°
Drum revolution speed 2000 rpm

No.	Block name	Signal	Normal track (For DAT and Pre-Recorded Tape)			Wide trak (For Pre-Recorded Tape)		
			Angle (deg)	Number of blocks	Period (μS)	Angle (deg)	Number of blocks	Period (μS)
1	MARGIN	1/2fch	5.051	11	420.9	5.051	11	420.9
2	PLL (SUB)	1/2fch	0.918	2	76.5	0.918	2	76.5
3	SUB-1		3.673	8	306.1	3.673	8	306.1
4	POST AMBLE	1/2fch	0.459	1	38.3	0.459	1	38.3
5	IBG	1/6fch	1.378	3	114.8	0.918	2	76.5
6	ATF		2.296	5	191.3	3.444	7.5	287.0
7	IBG	1/6fch	1.378	3	114.8	0.689	1.5	57.4
8	PLL (MAIN)	1/2fch	0.918	2	76.5	0.918	2	76.5
9	PCM		58.776	128	4898.0	58.776	128	4898.0
10	IBG	1/6fch	1.378	3	114.8	0.918	2	76.5
11	ATF		2.296	5	191.3	3.444	7.5	287.0
12	IBG	1/6fch	1.378	3	114.8	0.689	1.5	57.4
13	PLL (SUB)	1/2fch	0.918	2	76.5	0.918	2	76.5
14	SUB-2		3.673	8	306.1	3.673	8	306.1
15	POST AMBLE	1/2fch	0.459	1	38.3	0.459	1	38.3
16	MARGIN	1/2fch	5.051	11	420.9	5.051	11	420.9
Total			90	196	7500	90	196	7500

Fig. 1-3-1 Track Format

1.4 BLOCK FORMAT

One track consists of 196 blocks of signals, including 128 blocks for Main data. A block has the structure of the the Main block format shown in Fig. 1-4-1. One block corresponds to 1 frame (588 channel bits) of a CD (compact disc). The following data is included in the one block of Main area.

(1) SYNC (8 bits)

4T-4T indicates the beginning of the block (11T-11T in a CD).

(2) ID Code (8 bits)

The ID code indicates the characteristics of the Main data in the block.

(3) Block Address (8 bits)

Because there are 128 blocks of Main data on one track, a binary address (0000000 through 1111111) is added to each of the 128 (2^7) blocks.

(4) Parity (8 bits)

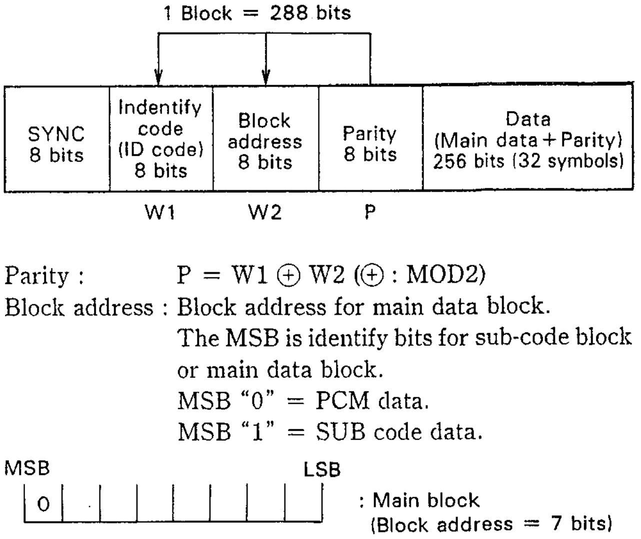
The parity bit for items (2) and (3) above, exclusive OR for items (2) and (3).

(5) Main data (256 bits)

32-symbol Main data and parity

Refer to "Sub-codes" on page 13 for details concerning items (2) and (3) above. The 32,768 (32 symbols × 128 = 4,096 symbols = 32,768 bits) bits of data in the Main area of a track has the capacity to record parity. This capacity is equivalent to 4 KB of RAM. In addition to the Main data, an ID code (IDENTIFY CODE : W1) and block address (W2) are provided, and a control signal for the Main signal is recorded.

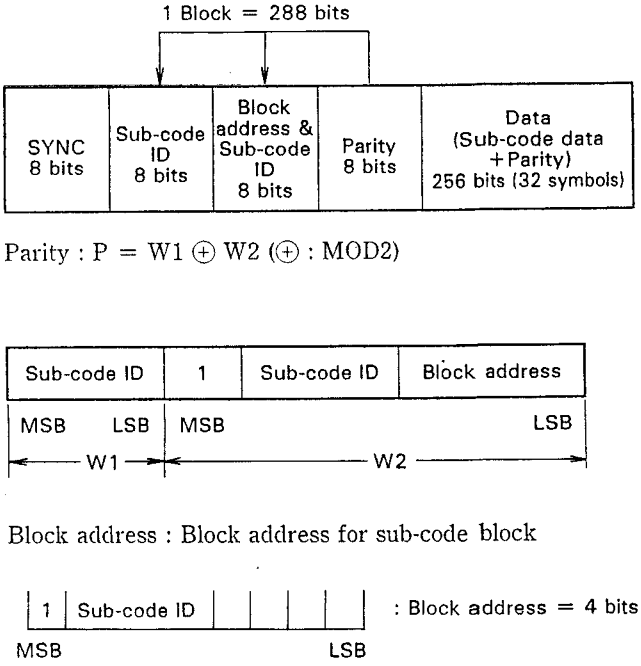
The sub-code blocks are the eight blocks before and after the Main area. The structure of a sub-code block is the same as a block of the Main area, and only the contents of W1 and W2 are different. For example, there are four bits from 0000 to 1111 because there are total of only 16 sub-code blocks on one track. Additionally, the most significant bit (MSB) of W2 is "0" in the Main area and "1" in the sub-code area, and that block contains the identifying bit for Main and sub-code areas (refer to page 13 for details).


1 Block = 288 bits
SYNC 8 bits
Indentify code (ID code) 8 bits
Block address 8 bits
Parity 8 bits
Data (Main data + Parity) 256 bits (32 symbols)
W1
W2
P
MSB
LSB
0
: Main block (Block address = 7 bits)

Parity : P = W1 ⊕ W2 (⊕ : MOD2)

Block address : Block address for main data block.
The MSB is identify bits for sub-code block or main data block.
MSB "0" = PCM data.
MSB "1" = SUB code data.

Fig. 1-4-1 Main Block Format


1 Block = 288 bits
SYNC 8 bits
Sub-code ID 8 bits
Block address & Sub-code ID 8 bits
Parity 8 bits
Data (Sub-code data + Parity) 256 bits (32 symbols)
Sub-code ID
1
Sub-code ID
Block address
MSB
LSB
MSB
LSB
W1
W2
1
Sub-code ID
: Block address = 4 bits
MSB
LSB

Parity : P = W1 ⊕ W2 (⊕ : MOD2)

Block address : Block address for sub-code block

Fig. 1-4-2 Sub-code Block Format

1.5 INTERLEAVE

Frequency sampling of 48kHz and 16-bit quantization are standard in the DAT operating mode. The 16 bits of data are divided into upper and lower areas of 8 bits each, and each bit is processed as one symbol. Compact discs employ the CIRC (Cross Interleave Reed-Solomon Code) error correction code, which is a combination of interleave and error correction. However, digital audio tape cannot use the same system as a compact disc because the time base must be compressed and expanded. Additionally, signal processing must position the lowest track for processing. Naturally, the lowest track must be synchronized with the head position (drum rotation position) at that time. The data capacity for processing contained in one track (half a rotation of the drum) is as follows because the drum revolution speed is 2,000rpm for 48kHz sampling frequency and the 16-bit quantization mode.

15 ms × 48kHz = 720 (number of sampling occurrences in half a rotation of the drum)

One sampling occurrence has two symbols each in the left and right channels. Therefore, the total number of symbols is 2,880 (720 × 2 × 2). Because one track has a capacity of 4,096 symbols, the remaining capacity can be used to record error correction codes. Additionally, the data capacity of this track is the equivalent of 4 KB of RAM. The DAT interleave consists of one separator for data that encompasses two tracks (one rotation of the drum). Refer to Fig. 1-5-1 Interleave Scheme for details.

The data capacity for one channel for one rotation of the drum (30 ms) is 1,440 words (2,880 symbols). Therefore, the data numbers range from 0 to 1439, and are divided into two tracks using the even and odd numbers for the left and right channels. One track (azimuth angle of +20 degrees) consists of the even numbers of the left channel and the odd numbers of the right channel. The next track (azimuth angle of −20 degrees) consists of the odd numbers of the right channel and the even numbers of the left channel. Next, data is arranged in one Main area divided into 8 upper bits and 8 lower bits as shown in Fig. 1-6-1 (a). Fig. 1-6-1 (a) shows a Main block (1 block = 32 symbols), and the block address within a track is shown in Fig. 1-6-1 (b). One data number corresponds to one location in Fig. 1-6-1 (a). Therefore, if this is mapped with the address of RAM, interleave can be accomplished by recording data input from a sequential analog-to-digital converter to the required RAM address. This is similar to the processing in the interleave of an 8-mm videotape recorder (VTR).

The A head (+ azimuth) and B head (− azimuth) are positioned as shown in Fig. 1-5-2 (a) so that a complete span is achieved. The even samplings of the L channel are recorded on the first half of the A head, and the odd samplings of the R channel are recorded on the latter half of the A head. The even samplings of the R channel are recorded on the first half of the B head, and the odd samplings of the L channel are recorded on the latter half of the B head. This allows correction of an entire erroneous track or dropouts up to 2,664 symbols by blinding the head.

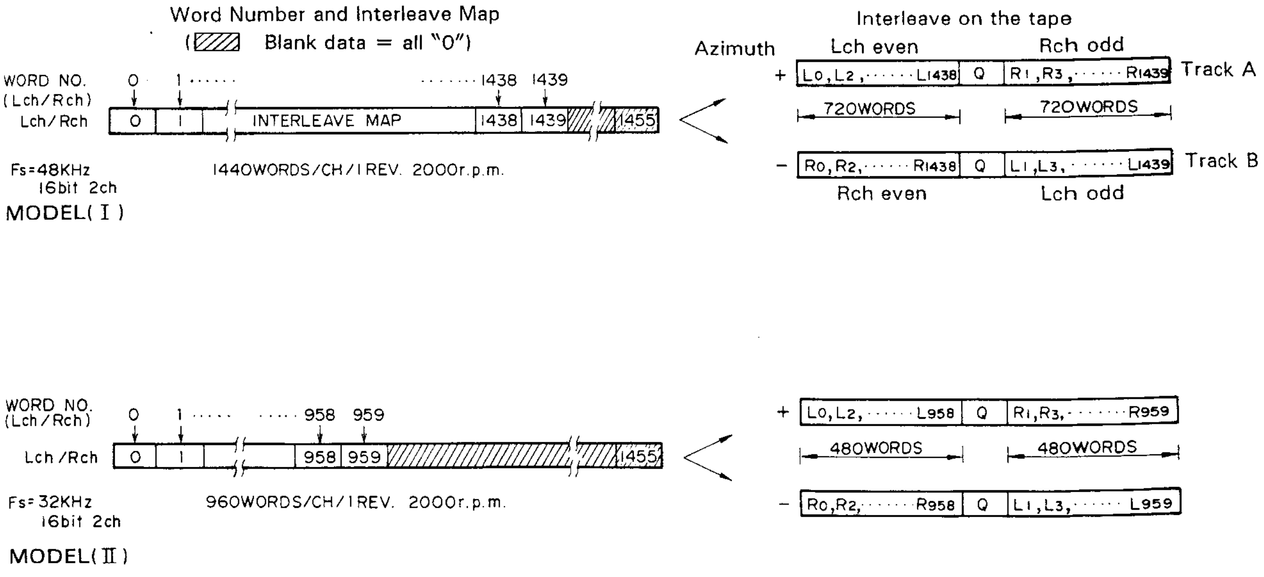

Word Number and Interleave Map
(▨ Blank data = all "0")
WORD NO. (Lch/Rch)
Lch/Rch
0
1
1438
1439
1455
INTERLEAVE MAP
Fs=48KHz 16bit 2ch
1440WORDS/CH/1REV. 2000r.p.m.
MODEL(I)
Interleave on the tape
Azimuth
Lch even
Rch odd
+
L0,L2,······L1438
Q
R1,R3,······R1439
Track A
720WORDS
720WORDS
−
R0,R2,······R1438
L1,L3,······L1439
Track B
Rch even
Lch odd
WORD NO. (Lch/Rch)
Lch/Rch
958
959
Fs=32KHz 16bit 2ch
960WORDS/CH/1REV. 2000r.p.m.
MODEL(II)
L0,L2,······L958
R1,R3,······R959
480WORDS
480WORDS
R0,R2,······R958
L1,L3,······L959

Fig. 1-5-1 Interleave Scheme (Modes I and II)

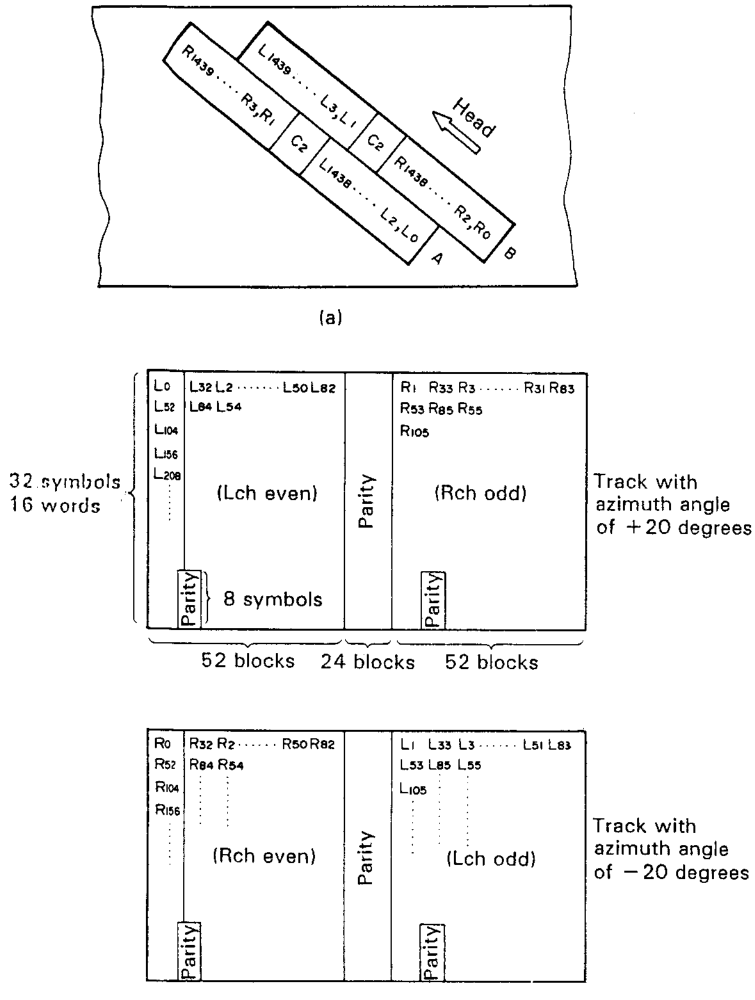
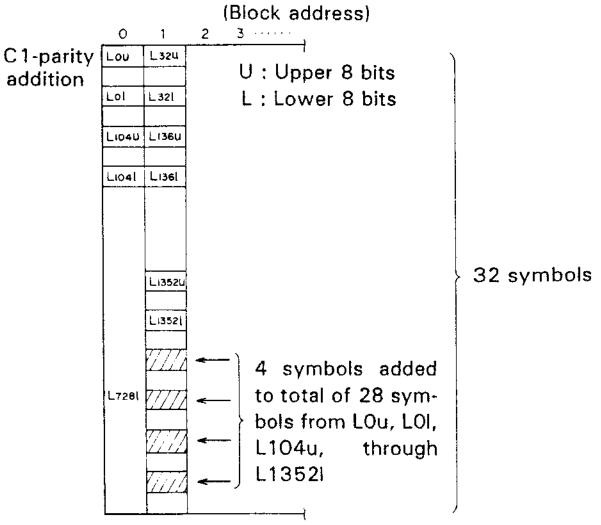

R1439 .... R3,R1
L1439 .... L3,L1
C2
C2
L1438 .... L2,L0
R1438 .... R2,R0
A
B
Head
(a)
L0 L52 L104 L156 L208
L32 L2 .... L50 L82
L84 L54
(Lch even)
Parity
R1 R33 R3 ...... R31 R83
R53 R85 R55
R105
(Rch odd)
Parity
8 symbols
Parity
32 symbols 16 words
Track with azimuth angle of +20 degrees
52 blocks
24 blocks
52 blocks
R0 R52 R104 R156
R32 R2 ...... R50 R82
R84 R54
(Rch even)
Parity
L1 L33 L3 ...... L51 L83
L53 L85 L55
L105
(Lch odd)
Parity
Parity
Track with azimuth angle of −20 degrees
(b)

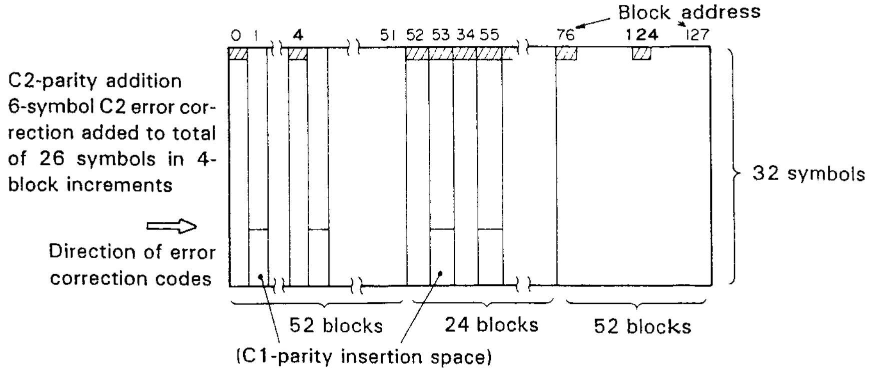
Fig. 1 – 5 – 2 Interleave Format

1.6 ERROR CORRECTION CODE

An error correction code is added to data for which interleave has been completed (Fig. 1–6–1). First, a 4-symbol C1-parity is added to each of the 28 symbols of data from L0u, L0l, L104u, through L1352l, as shown in Fig. 1–6–1 (a). Then, four symbols are added below the 28 symbols from L0u, L0l, L104u, through L1352l. A C1-parity spans two blocks, and the C1-parity within two blocks comprises eight symbols. Next, a 6-symbol C2-parity is added to a total of 26 symbols in 4-block increments from block 0, block 4, through block 124. The C2-parity is sandwiched into a position in the Main data. One track (total number of error correction codes in one Main area) contains a total of 1,184 symbols (C1 4 × 128 = 512, C2 32 × 12 + 24 × 12 = 672). Because the data capacity of one track is 4,096 symbols, the data capacity for non-parity information is 2,912 symbols (4,096 − 1,184). However, 32 symbols are leftover because the data capacity of this interval is 2,880 symbols. These 32 symbols are filled with zeroes. This portion of the block corresponds to word numbers 1440 through 1455 shown in Fig. 1–5–1.


(Block address)
0 1 2 3 ......
C1-parity addition
L0u L32u
L0l L32l
L104u L136u
L104l L136l
L1352u
L1352l
L728l
U : Upper 8 bits
L : Lower 8 bits
32 symbols
4 symbols added to total of 28 symbols from L0u, L0l, L104u, through L1352l

(a)


Block address
0 1 4
51 52 53 34 55
76
124 127
C2-parity addition
6-symbol C2 error correction added to total of 26 symbols in 4-block increments
Direction of error correction codes
32 symbols
52 blocks
24 blocks
52 blocks
(C1-parity insertion space)

(b)

Fig. 1 – 6 – 1 Addition of Error Correction Codes

1.7 8 – 10 MODULATION

The 8 bits of data that allows easy control and demodulation of the frequency band of a signal recorded on the disc of a CD was changed to 14 bits in order to perform EFM modulation. EFM is a type of modulation that selects a 256-bit (2^8) pattern [factor of 4,096 (2^{14})] and handles 8-bit data so that the minimum inversion space (Tmin) is 3 bits and the maximum inversion space (Tmax) is 11 bits. DAT 8 – 10 modulation handles 8-bit data so that Tmax is 4 bits (factor of 1,024) and Tmin is 1 bit. DAT 8 – 10 modulation also handles a 10-bit pattern. Additionally, items having a DC component within ±2 are selected for this 10-bit pattern. As seen from the conversion table, there are two 10-bit patterns for one 8-bit data item. If the DC component of the 10-bit pattern is 0, the two patterns are the same. If the DC component is ±2, the most significant bit (MSB) is changed to 0 or 1 and the remaining nine bits of the pattern are the same. The Q in the table represents the characteristics of the code. If Q equals 1, the next code will be selected from the pattern of the Q' = 1 column corresponding to the data. If Q equals −1, the pattern in the Q' = −1 column on the left will be selected. DC is 0 or −2 in the Q' = 1 column, and DC is 0 or +2 in the Q' = −1 column. If DC equals 0, the 10-bit codes are the same regardless of the value of Q'. However, the value of Q differs for the Q' = 1 column and the Q' = −1 column. The 8-bit data repeated the same value when the data was 80 (assume Q' = 1).

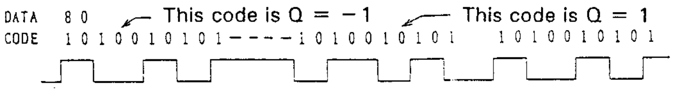

DATA 8 0
This code is Q = −1
This code is Q = 1
CODE 1 0 1 0 0 1 0 1 0 1 – – – – 1 0 1 0 0 1 0 1 0 1 1 0 1 0 0 1 0 1 0 1

Fig. 1 – 7 – 1

As shown in the above diagram, the polarity is inverted and recorded on the tape even though the code is the same. Next, if DC equals 2 or −2, the 10-bit code is different, but the value of Q is the same. Use Q' = 1 if it is assumed that the data repeated the same value like the above diagram.

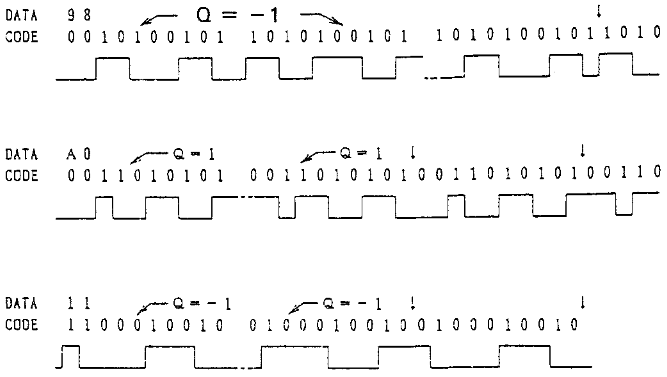

DATA 9 8
Q = −1
CODE 0 0 1 0 1 0 0 1 0 1 1 0 1 0 1 0 0 1 0 1 1 0 1 0 1 0 0 1 0 1 1 0 1 0
DATA A 0
Q = 1
Q = 1
CODE 0 0 1 1 0 1 0 1 0 1 0 0 1 1 0 1 0 1 0 1 0 0 1 1 0 1 0 1 0 1 0 0 1 1 0
DATA 1 1
Q = − 1
Q = − 1
CODE 1 1 0 0 0 1 0 0 1 0 0 1 0 0 0 1 0 0 1 0 0 1 0 0 0 1 0 0 1 0

Fig. 1 – 7 – 2

As shown in the above diagram, the DC component alternates repeatedly between + and − to invert the polarity and cause recording, and the D.S.V. (Digital Sum Value) of the recording signal approaches zero. In DAT, the interleave cannot be accomplished during playback unless the data from the two tracks is united because the Main data is interleaved on two tracks. The data capacity of these two tracks is 8,192 symbols (4,096 × 2) or 65,536 bits. This is the equivalent of 8 KB of RAM. During playback, data must be output to a digital-to-analog converter while unraveling the interleave, and the data for playback must be written to RAM. The reverse of this process occurs during recording. The data to be recorded must be transferred to the head while being interleaved. Therefore, there must be at least two 8-KB blocks available as RAM for repeated alternating processing.

Data	: Main (pulse code modulation) data
Code	: Selects encoder code of NRZI modulator and Q' (Q data obtained from previous code)
Coding direction	: Left to right (from most significant bit to least significant bit)
Q'	: DC data of previous code
Q	: DC data of current code

		Q′ = −1			Q′ = 1		
	DATA (MSB…LSB)	CODE (MSB…LSB)	DC	Q	CODE (MSB…LSB)	DC	Q
00	00000000	0101010101	0	1	0101010101	0	−1
01	00000001	0101010111	0	−1	0101010111	0	1
02	00000010	0101011101	0	−1	0101011101	0	1
03	00000011	0101011111	0	1	0101011111	0	−1
04	00000100	0101001001	0	−1	0101001001	0	1
05	00000101	0101001011	0	1	0101001011	0	−1
06	00000110	0101001110	0	1	0101001110	0	−1
07	00000111	0101011010	0	1	0101011010	0	−1
08	00001000	0101110101	0	−1	0101110101	0	1
09	00001001	0101110111	0	1	0101110111	0	−1
0A	00001010	0101111101	0	1	0101111101	0	−1
0B	00001011	0101111111	0	−1	0101111111	0	1
0C	00001100	0101101001	0	1	0101101001	0	−1
0D	00001101	0101101011	0	−1	0101101011	0	1
0E	00001110	0101101110	0	−1	0101101110	0	1
0F	00001111	0101111010	0	−1	0101111010	0	1
10	00010000	1101010010	0	1	1101010010	0	−1
11	00010001	0100010010	2	−1	1100010010	−2	−1
12	00010010	0101010010	0	−1	0101010010	0	1
13	00010011	0101110010	0	1	0101110010	0	−1
14	00010100	1101110001	2	1	0101110001	−2	1
15	00010101	1101110011	2	−1	0101110011	−2	−1
16	00010110	1101110110	2	−1	0101110110	−2	−1
17	00010111	1101110010	0	−1	1101110010	0	1
18	00011000	0101100101	2	−1	1101100101	−2	−1
19	00011001	0101100111	2	1	1101100111	−2	1
1A	00011010	0101101101	2	1	1101101101	−2	1
1B	00011011	0101101111	2	−1	1101101111	−2	−1
1C	00011100	0101111001	2	1	1101111001	−2	1
1D	00011101	0101111011	2	−1	1101111011	−2	−1
1E	00011110	0101111110	2	−1	1101111110	−2	−1
1F	00011111	0101101010	2	−1	1101101010	−2	−1

Fig. 1−7−3 8−10 Conversion Table

1.8 AUTOMATIC TRACK FINDING (ATF)

Automatic Track Finding (ATF) is a tracking control system that ensures that heads accurately trace over narrow 13μm tracks. The principle is to control the servo system so that the cross talk values of the ATF signals for the tracks to the left and right of the track being traced are equalized and the data speed is regulated. The signal sequence and length are fixed for DAT for recording on one track. The three major elements are SUB, ATF, and Main, and each of these is divided into finer detail. One track consists of 196 blocks.

The ATF track pattern is shown in Fig. 1–8–2.

The signals are broadly divided and arranged on a track in the order of ATF signals first, followed by data signal ATF signals. ATF signals consist of a combination of frequencies f_1, f_2, f_3, and f_4. The frequencies are respectively 130.67kHz, 522.67kHz, 784.00kHz, and 1.568MHz.

Detailed examination of an ATF signal block shows that there is a margin space called an Inter Block Gaps (IBG) on both sides. This space is for absorbing signal position errors during overwriting. Writing a 1.568MHz signal has the function of erasing the previous recording.

The principal frequency of ATF is 130kHz (f_1). f_2 and f_3 are synchronization signals that are used to create sampling pulses. Observe ATF (1) of the second track (A head even frame) from the left in Fig. 1–8–2. IBG are passed over when the A head traces this track. The IBG signal (f_4 = 1.5MHz) is not detected because the band-pass filter is passed at point Ⓑ in Fig. 1–8–1. A major 130kHz signal is detected at point Ⓑ when the head passes f_1. Then, when the head passes f_4, f_2, and f_4, the f_1 of the neighboring track on the right and the f_1 of the neighboring track on the left are detected as cross talk of adjoining tracks.

The cross talk values are proportionate to whether the head traces from the track center to the right or traces from the left. The f_1 detection values for the tracks adjoining on the left and right should be equal when the head is tracing properly. Stated differently, tracking control is effected so that both f_1 detection values become equal. This control method is the basic principle of ATF for digital audio tape.

Generally, the head width is designed in consideration of track curvature and is fabricated to be approximately 1.5 times the track pitch. Therefore, playback from adjacent tracks is possible.

The actual circuit is represented in Fig. 1–8–1. Signals that have passed the band-bypass filter (point Ⓑ) are subjected to envelope detection and fed to S/H1 and S/H2.

The RF signal is converted to a digital signal by the comparator and input to the controller, and sampling pulses Ⓒ and Ⓓ are created.

The sampling pulse outputs Ⓒ if a synchronizing signal is detected. That causes the previous track level to be held in S/H1, and outputs Ⓓ after a delay of two blocks. A difference in adjacent levels is held in S/H2, and the two different output signals are fetched as tracking error output. Tracking is performed by feedback of this error signal to the capstan motor.

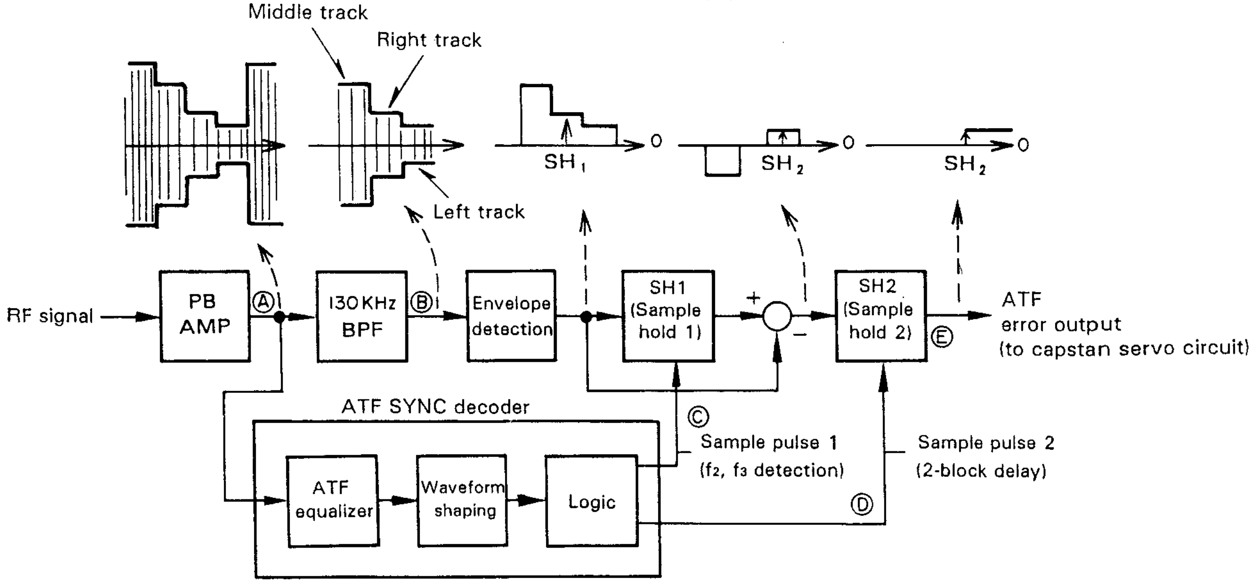
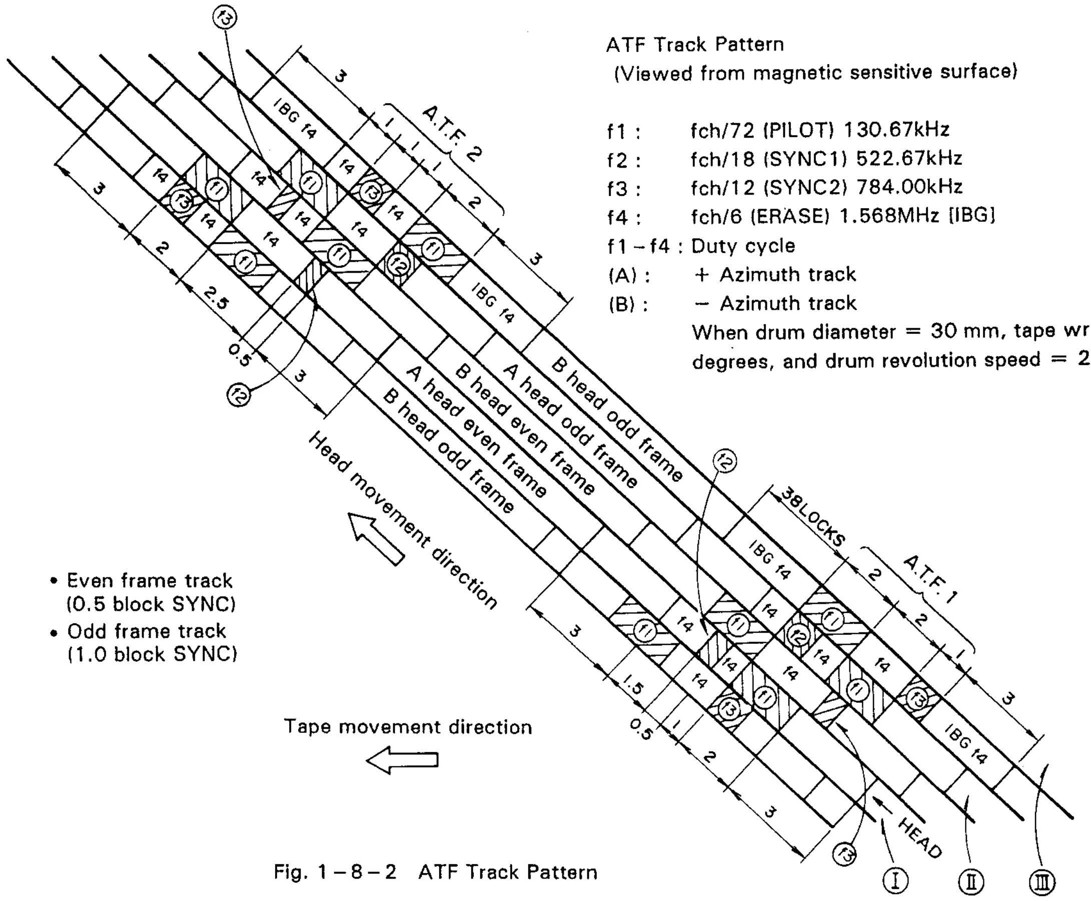


Fig. 1–8–1 ATF Block Diagram


3
IBG f4
A.T.F. 2
1
1
1
2
3
IBG f4
f4
ⓕ1
ⓕ3
ⓕ2
3
2
2.5
0.5
3
A head even frame
B head odd frame
B head even frame
A head odd frame
B head odd frame
Head movement direction
• Even frame track
(0.5 block SYNC)
• Odd frame track
(1.0 block SYNC)
Tape movement direction
38LOCKS
A.T.F. 1
IBG f4
1.5
0.5
1
2
3
HEAD
Ⓘ
Ⓘ
Ⓘ

ATF Track Pattern
(Viewed from magnetic sensitive surface)

f1 : fch/72 (PILOT) 130.67kHz
f2 : fch/18 (SYNC1) 522.67kHz
f3 : fch/12 (SYNC2) 784.00kHz
f4 : fch/6 (ERASE) 1.568MHz (IBG)
f1 – f4 : Duty cycle
(A) : + Azimuth track
(B) : – Azimuth track
When drum diameter = 30 mm, tape wrap angle = 90 degrees, and drum revolution speed = 2000 rpm

Fig. 1 – 8 – 2 ATF Track Pattern

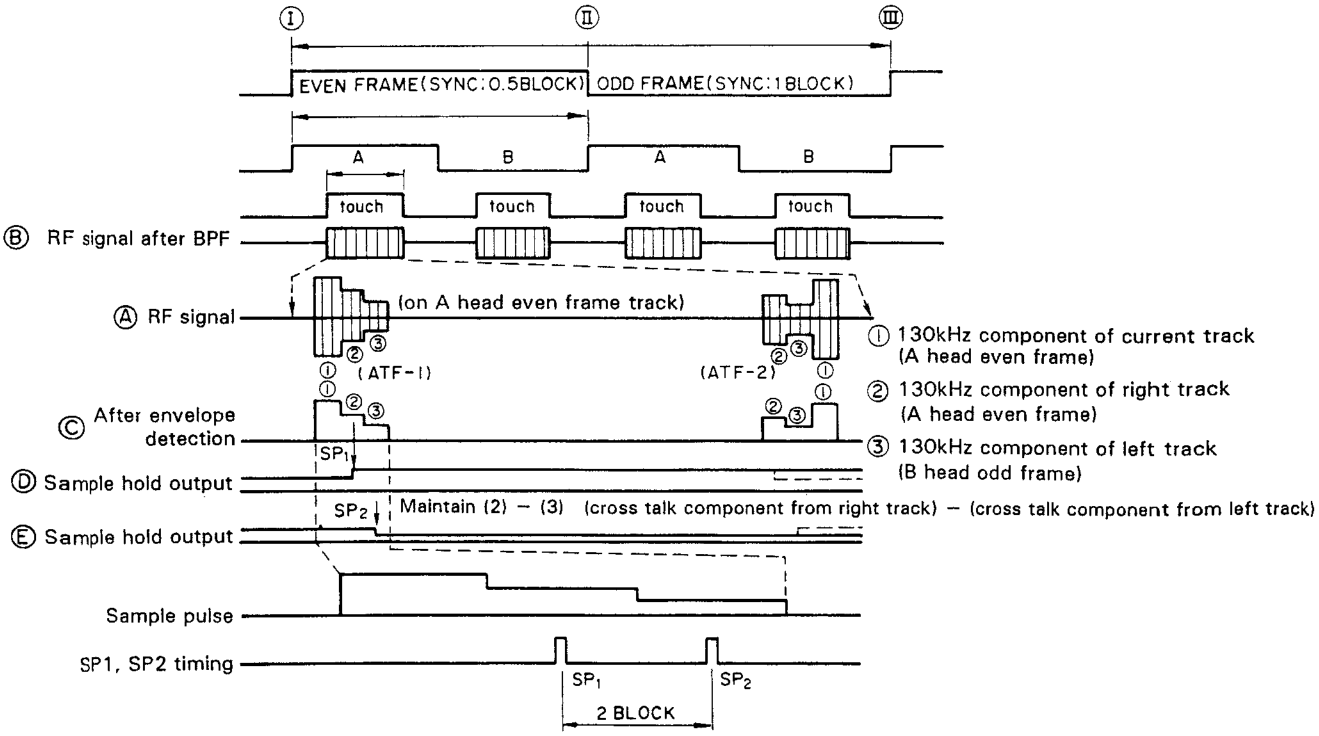
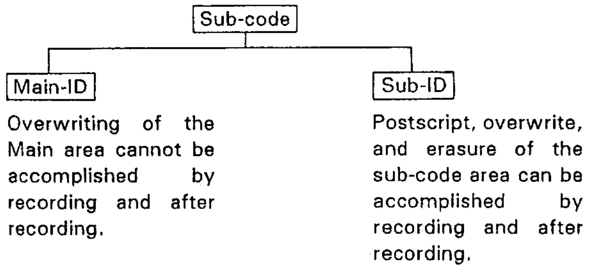

Ⓘ
Ⓘ
Ⓘ
EVEN FRAME(SYNC:0.5BLOCK)
ODD FRAME(SYNC:1BLOCK)
A
B
A
B
touch
touch
touch
touch
Ⓑ RF signal after BPF
Ⓐ RF signal
(on A head even frame track)
① ② ③
(ATF-1)
(ATF-2)
Ⓒ After envelope detection
Ⓓ Sample hold output
SP1
SP2
Maintain (2) – (3) (cross talk component from right track) – (cross talk component from left track)
Ⓔ Sample hold output
Sample pulse
SP1, SP2 timing
SP1
SP2
2 BLOCK
① 130kHz component of current track (A head even frame)
② 130kHz component of right track (A head even frame)
③ 130kHz component of left track (B head odd frame)

Fig. 1 – 8 – 3 Timing Chart

1.9 SUB-CODES

A major feature of digital audio tape lies in its ability to realize many functions through the use of sub-codes. There are essentially two types of sub-codes. There are sub-codes that are recorded in Main areas that record music signals, and sub-codes that are recorded in sub-code areas. Signals that are recorded in Main areas are control signals required for playback of Main signals, and they are simultaneously recorded along with music. Items recorded in a fixed sub-code area are recorded in a location separate from music signals and independently from the recording of music. This means that this portion can be recorded again or different control signals can be recorded or erased after music is recorded. Tune order and the beginning position of the tune can be recorded, and programmed play, direct selection, and many other functions can be incorporated. Additionally, program time, absolute time, running time (time code), TOC (program table of contents), calendars, catalogue numbers, and other information can be recorded. The capacity of this area is fairly large (4.6 times a compact disc) and there are many possibilities for adding new functions in the future.



Overwriting of the Main area cannot be accomplished by recording and after recording.

Postscript, overwrite, and erasure of the sub-code area can be accomplished by recording and after recording.

● Status ID's

Generally, the codes shown below are recorded in the sub-ID. This sub-ID has the capacity to be overwritten and erased by after recording.

TOC-ID :

Indicates whether the program is registered in TOC.

START-ID :

A 9-second interval from the beginning of the tune is recorded, and it is used for finding the beginning of a tune during high-speed search. Unrecorded portions are automatically detected during recording and a flag can be set. However, a pianissimo passage in classical music may be judged as an unrecorded portion and the flag will be set within a tune.

Shortening ID :

Generally, the Shortening ID is called the skip ID. Control skips from the location where this ID is encountered and jumps to the next START-ID.

Priority ID :

The Priority ID determines whether a signal exists in the PNO-ID (program number) of the sub-code area. If a signal exists, the Priority ID gives the PNO-ID a priority code higher than the tune number of the Main area.

PNO-ID (program number) :

The PNO-ID is a code that indicates the recorded tune order. Generally, the PNO-ID and START-ID are recorded as a pair. The recorded order of tunes is lost if a new START-ID is created or an unnecessary ID is erased by after recording. The recorded order of tunes can be maintained using a renumbering function.

PNO-OEE :

PNO-OEE is a flag set at the end of a recorded portion that is used for end search. It is one element of PNO-ID.

● Sub-codes

The DAT format can record and playback information other than Main data as a sub-code (after recording).

● Main area

The Main-ID consists of ID1 through ID7, and it is recorded in the W1 area of the block format.
ID1 : Emphasis
ID2 : Sampling frequency
ID3 : Number of channels
ID4 : Number of quantization bits
ID5 : Track pitch
ID6 : Copy prohibit
ID7 : PACK data (see page 16)

Each of these codes consists of two bits, and they are recorded in the four bits of the W1 area of every other block (in even block address frames) as shown in Fig. 1-9-1. Therefore, the Main-ID is repeated and recorded 16 times in one track (128 blocks) because the same data is repeated once every eight blocks.

● Sub-code area

Sub-ID (the following four types exist)
① Control ID (4 bits)
② Data ID (4 bits)
③ Pack ID (3 bits)
④ Program number ID

Sub-code data
Different types of data can be recorded as a 64-bit (8 symbols) PACK.

[Main-ID]

ID-1	Emphasis
ID-2	Sampling Frequency
ID-3	Number of Channel
ID-4	Quantization
ID-5	Track Pitch
ID-6	Digital Copy
ID-7	Pack

[Control ID's within the sub-code ID]

TOC-ID	TOC recording (Y/N)
Start-ID	Tune start, tune end
Shortening-ID	Fast forwards to next START-ID when this ID is present
Priority-ID	Recorded tune order after recording (Y/N)

● Main-ID (W1/ID code in Main area) Contents

W1			W2 (Block address) 8 bits		
(2 bits)	(2 bits)	(4 bits)			
Format ID	Emphasis	※ Frame address	0	××××	000
00 : For audio use 01 : For data use	00 : OFF 01 : ON (50/15μS)				
Reserved			0	××××	001
Sampling frequency (Hz)	Number of channel	※ Frame address	0	××××	010
00 : 48 kHz 01 : 44.1 kHz 10 : 32 kHz	00 : 2 CH 01 : 4 CH				
Reserved			0	××××	011
Quantization	Track pitch	※ Frame address	0	××××	100
00 : 16 bits uniform 01 : 12 bits non-uniform	00 : Normal track mode 01 : Wide track mode				
Reserved			0	××××	011
Digital copy	Pack data	※ Frame address	0	××××	110
00 : Permitted 10 : Prohibited 11 : Special	Pack contents				
Reserved			0	××××	111

※Frame address (0000~1111, Factor of 16)
The two tracks of one interleave pair have the same frame address.

The Main-ID is repeated and the same data is recorded 16 times on one track because one group consists of a total of eight symbols.

[128 blocks (0000000~1111111) are included on one track]

Main area : 0
Sub-code area : 1

Fig. 1-9-1 Main-ID

● Sub-code ID

Sub-code ID (W1)					W2		
4 bits				4 bits	MSB	Sub-code ID (3 bits)	Block address (4 bits)
Control ID				Data ID	MSB	Pack ID	× × × 0
Priority ID	Start ID	Shortening ID	TOC ID	0000	1	These three bits indicate the number of PACK's within two blocks.	The address is also 0000~1111 because there are 16 blocks in one track.
1 : Priority 0 : No priority	1 : Program start (9 seconds) 0 : Within the tune	1 : Skip 0 : OFF	1 : TOC 0 : OFF				
Program No. 2				Program No. 3	1	Program No. 1	× × × 1

Fig. 1－9－5 Sub-code ID

There are eight sub-code blocks before and after the ATF areas on one track. Like the Main block, 32 symbols of data and the parity are included in one block. One PACK consists of 64 bits (eight symbols) (see PACK FORMAT). Therefore, four PACK's are included in one sub-code block, and two blocks have a total of eight PACK's. Seven data items are included as a PACK because one block within a PACK is for the C1 error correction code. The PACK ID shows the number of PACK's actually recorded in the two blocks and the position.

Example :

P－ID ＝ 001
(Pack ID)

	W1		W2			Parity	Data	
SYNC	CONTROL ID	0000	1	001 (Pack ID)	× × × 0	Parity (8bits)	Pack-1	All "0"
SYNC			1		× × × 1	P	All "0"	C1

P－ID ＝ 110
(Pack ID)

	W1		W2			Parity	Data			
SYNC	CONTROL ID	0000	1	110 (Pack ID)	× × × 0	P	Pack-1	Pack-3	Pack-5	All "0"
SYNC			1		× × × 1	P	Pack-2	Pack-4	Pack-6	C1

Fig. 1－9－6 Pack-ID

● PACK Format

A PACK consists of a total of eight symbols.

* ITEM (indicates contents of information included in a PACK)

Pack item	Contents	Remarks
0000	Reserved	
0001	Program time	Program number, index number and continuous time code within a program
0010	Absolute time	Program number, index number and continuous time code on a tape
0011	Running time	PC1, B3 = 0 : specified in this sub-clause for consumer use PC1, B3 = 1 : for professional use
0100	TOC	Table of contents
0101	Date	Year, month, day, the day of the week, hour, minute, second
0110	Catalog number	Catalog number of the cassette
0111	ISRC	The international Standard Recording Code
1000	Pro binary	For professional use
1001	Character	Character information
1010	Reserved	
1011	Reserved	
1100	Reserved	
1101	Reserved	
1110	Reserved	
1111	Reserved	To be defined by pre-recorded tape manufactuturers

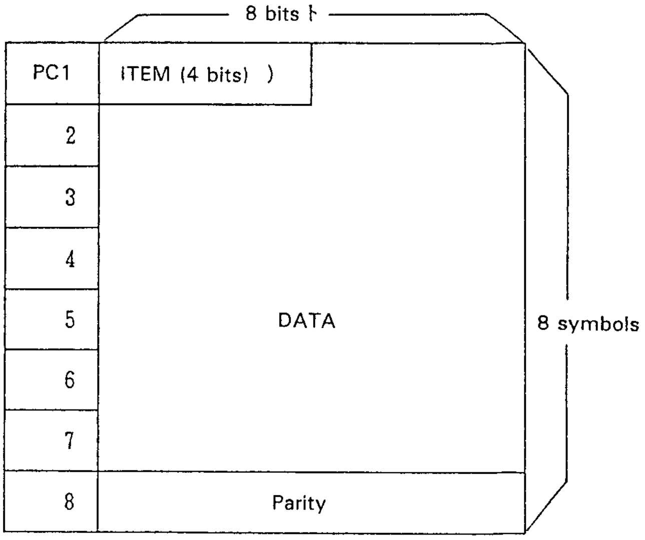

8 bits
PC1
ITEM (4 bits)
2
3
4
5
6
7
8
DATA
Parity
8 symbols

Fig. 1－9－7

● PACK in Main area

ID-7 (2 bits) of the Main-ID is PACK DATA, and the configuration of one PACK is shown below.

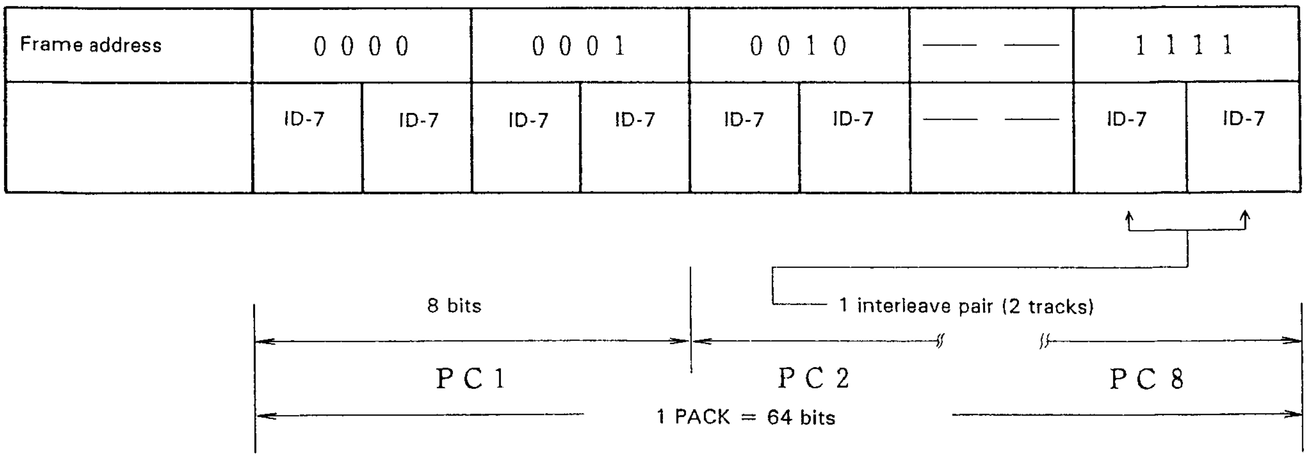

Frame address
0 0 0 0
0 0 0 1
0 0 1 0
1 1 1 1
ID-7
ID-7
ID-7
ID-7
ID-7
ID-7
ID-7
ID-7
1 interleave pair (2 tracks)
8 bits
P C 1
P C 2
P C 8
1 PACK = 64 bits

Fig. 1－9－8 PACK Format

The data of one PACK is recorded across 32 tracks in sections corresponding to frame addresses 0000 through 1111. ID-7 is recorded at block address 0××××110 (6 + 8n (n = 0 to 15)).

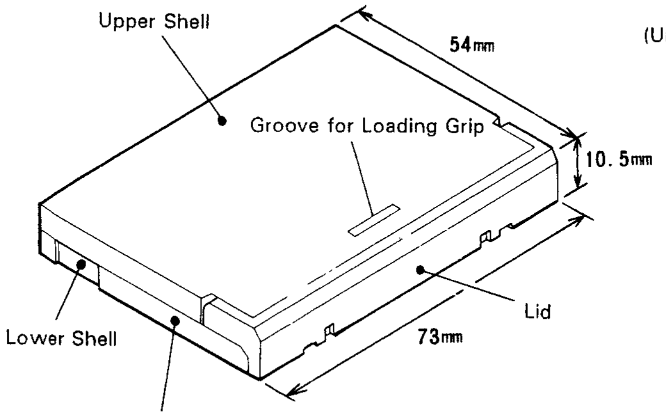
Stated differently, there are 16 occurrences of ID-8 on one track (block addresses 0 through 127). Therefore, 16 PACK's are formed by frame addresses 0000 through 1111 on 32 tracks.

The data for one PACK must be recorded in a minimum of two locations. Therefore, the data for block address 6 + 8n (n = 0 to 7) is also recorded at block address 6 + 8n (n = 8 to 15).

1.10 DAT CASSETTE STRUCTURE

The appearance of the cassette is shown in Fig. 1-10-1. The cassette dimensions are 73 mm (L), 54 mm (W), and 10.5 mm (H), which makes it considerably smaller than conventional compact cassettes.

Top View


Upper Shell
54mm
Groove for Loading Grip
10. 5mm
Lid
Lower Shell
73mm
Slider

Bottom View

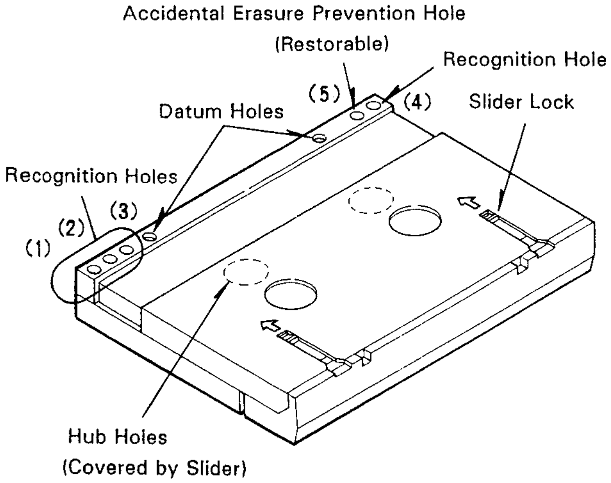

Accidental Erasure Prevention Hole
(Restorable)
Recognition Hole
(5)
(4)
Slider Lock
Datum Holes
Recognition Holes
(3)
(2)
(1)
Hub Holes
(Covered by Slider)

Fig. 1-10-1 Outside View of DAT Cassette

The DAT cassette has a lid to protect the tape. The lid and slider are shown in Fig. 1-10-1. The lid and slider are ordinarily closed to prevent dust and fingerprints on the surface of the tape. Additionally, the cassette is engineered so that the brake does not make contact with the reel and slackness in winding does not occur when the lid and slider are closed. The quality of the metal tape is higher than the metal tape of audio cassettes and magnetic materials are employed to allow high density recording.

The dimensions of DAT cassettes and other types of cassettes are compared in Fig. 1-10-2.

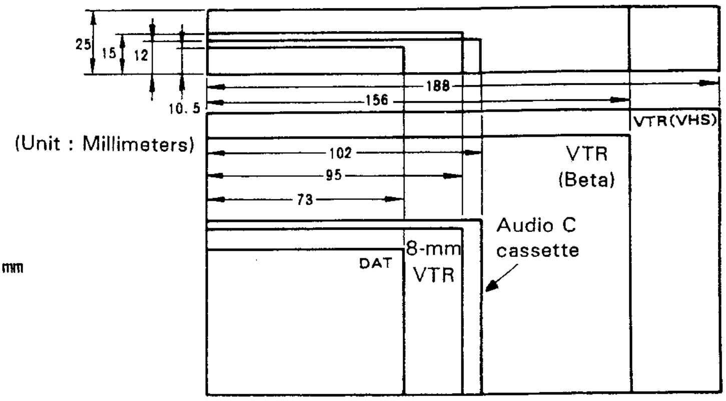

25
15
12
10. 5
188
156
(Unit : Millimeters)
102
95
73
VTR(VHS)
VTR
(Beta)
Audio C
cassette
DAT
8-mm
VTR

Fig. 1-10-2 Comparison of Dimensions for DAT Cassettes and other Cassettes

A prism is integrated into the DAT tape cassette. As shown in Fig. 1-10-3, light from an external LED strikes the prism integrated into the cassette. In the transparent portion of the leader tape, the reflected light from the prism is radiated onto a phototransistor and the beginning or end of the tape can be detected. Tape end detection is performed to prevent the tape from breaking when winding at high speed, and the brake is immediately applied when the tape end is detected. Additionally, chrome tape, barium ferrite, and other materials with excellent properties are being investigated even though their coercive force is limited in prerecorded tapes due to contact printing.

There are five types of recognition holes in a DAT cassette as shown in Fig. 1-10-1. Recognition holes to prevent recording work the same way as those of conventional cassettes. However, the DAT cassette also has other types of exclusive recognition holes (see Fig. 1-10-4). Recognition hole (5) indicates whether or not recording is possible.

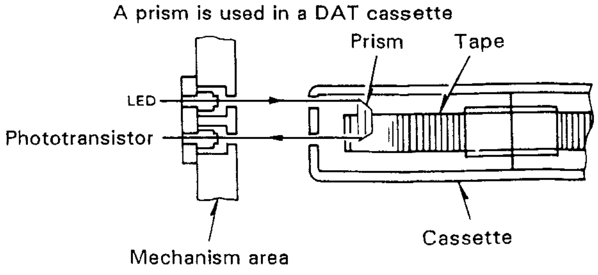

A prism is used in a DAT cassette
Prism
Tape
LED
Phototransistor
Cassette
Mechanism area

Fig. 1-10-3 Tape Beginning and End Detection Method for Digital Audio Tape

"1" : Open "0" : Closed

Recognition Hole (1)	Recognition Hole (2)	Recognition Hole (3)	
0	0	0	Metal tape or equivalent product/tape thickness 13μm
0	1	0	Metal tape or equivalent product/thin tape
0	0	1	Track pitch 1.5×/tape thickness 13μm
0	1	1	Track pitch 1.5×/thin tape
1	×	×	(Reserved)

Recognition Hole (4)	
1	Prerecorded tape
0	Non-prerecorded tape (Conventional tape for recording and playback)

Recognition Hole (5)	Original condition can be restored by opening or closing the slider
1	Recording impossible
0	Recording possible

Fig. 1-10-4

Conventional audio cassettes allow prevention of accidental erasures by breaking off a tab on the back of the cassette. However, this is not convenient because the original condition cannot be restored once the tab is broken. The DAT cassette has improved this system by allowing and preventing recording by opening and closing a control on the back of the cassette (see Fig. 1-10-5).

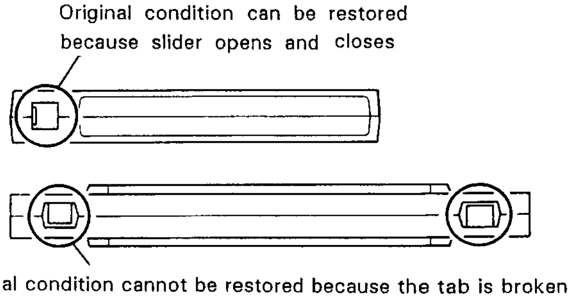

Original condition can be restored because slider opens and closes
Original condition cannot be restored because the tab is broken

Fig. 1-10-5 Accidental Erasure Prevention Holes of C Cassette and DAT Cassette

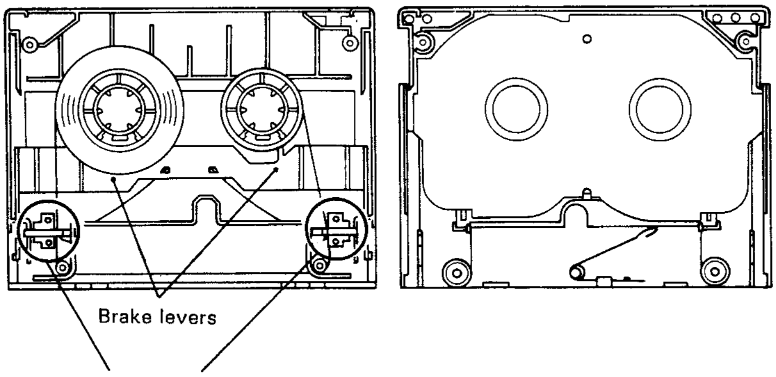

Brake levers
Prisms

Fig. 1-10-6 DAT Cassette Interior

2. CIRCUIT DESCRIPTION

● Serial Copy Management System (SCMS) Overview

The new system, which is called the Serial Copy Management System, digitally controls serial copy. DAT's equipped with this system have the following features :

- Digital copy can be accomplished regardless of the copy prohibit code and sampling frequency (32, 44.1, and 48kHz).
- Digital copy can be accomplished from CD's, DAT music tapes, and other digital sources that are copyrighted. However, it is not possible to make another digital copy from a copied tape (see Fig. 1 – a).
- Broadcast satellite (BS), digital microphone, and other digital signals not having copy prohibit codes have no particular limitations. Therefore, digital copy can be freely accomplished (see Fig. 1 – b).
- Copy prohibit codes do not exist in analog signals. Therefore, copy is possible. Regardless of its contents, a copied tape can be used as a DAT music tape that has a copy prohibit code. Because there is no identification system for determining the existence or nonexistence of a copyright, digitally recorded tapes of analog signals can be used again to make more digital copies. However, those tapes cannot be copied to again. This means that once signals that have passed through an analog-to-digital converter have been recorded on digital audio tape, the recorded tape becomes a DAT music tape with a copy prohibit code (see Fig. 1 – d).
- Separate analog-to-digital converters and other general category products can accomplish digital copy up to two times from original digital sources, like the above copy from analog signals. Digital copy cannot be accomplished more than twice due to the limitations imposed by the specifications (see Fig. 1 – c).

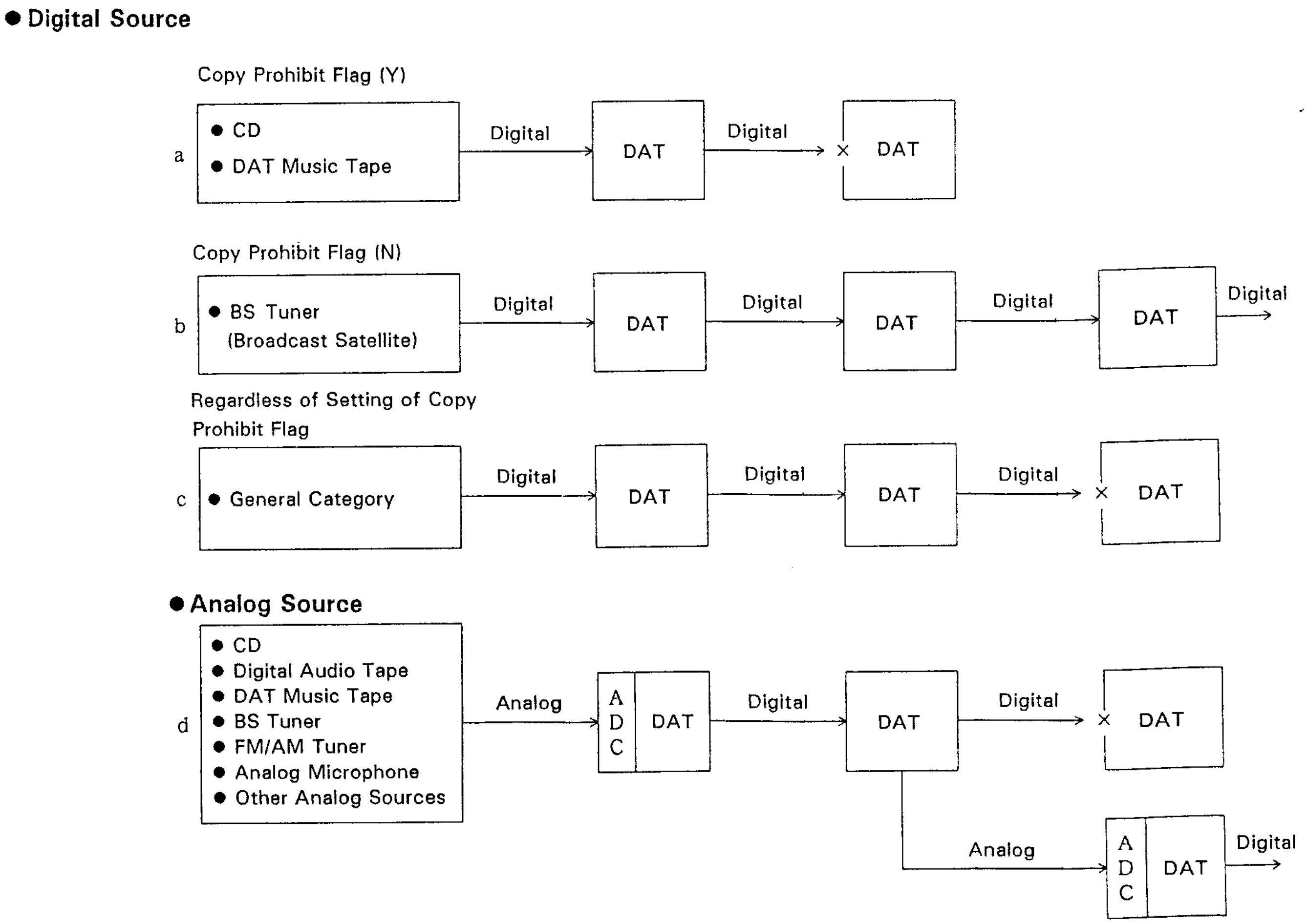

● Digital Source
Copy Prohibit Flag (Y)
a
● CD
● DAT Music Tape
Digital
DAT
Digital
×
DAT
Copy Prohibit Flag (N)
b
● BS Tuner
(Broadcast Satellite)
Digital
DAT
Digital
DAT
Digital
DAT
Digital
Regardless of Setting of Copy Prohibit Flag
c
● General Category
Digital
DAT
Digital
DAT
Digital
×
DAT
● Analog Source
d
● CD
● Digital Audio Tape
● DAT Music Tape
● BS Tuner
● FM/AM Tuner
● Analog Microphone
● Other Analog Sources
Analog
ADC
DAT
Digital
DAT
Digital
×
DAT
Analog
ADC
DAT
Digital

Fig. 1 Serial Copy Management System
(Handles fs = 32kHz, 44.1kHz, and 48kHz)

●SCMS Details

The determination of whether or not copy can be accomplished using SCMS is performed by the 2-bit copy prohibit code recorded on the digital audio tape and the copy prohibit bit and category code defined by the digital I/O interface. The copy prohibit code within the DAT format uses the two bits of ID6 of MAIN ID. In the past, the two choices of "copy permitted" (00) and "copy prohibited" (10) were defined. The choice of "special copy" (11) has been newly added, and digital copy from tapes recorded with this code can be accomplished for one generation only (see Fig. 2).

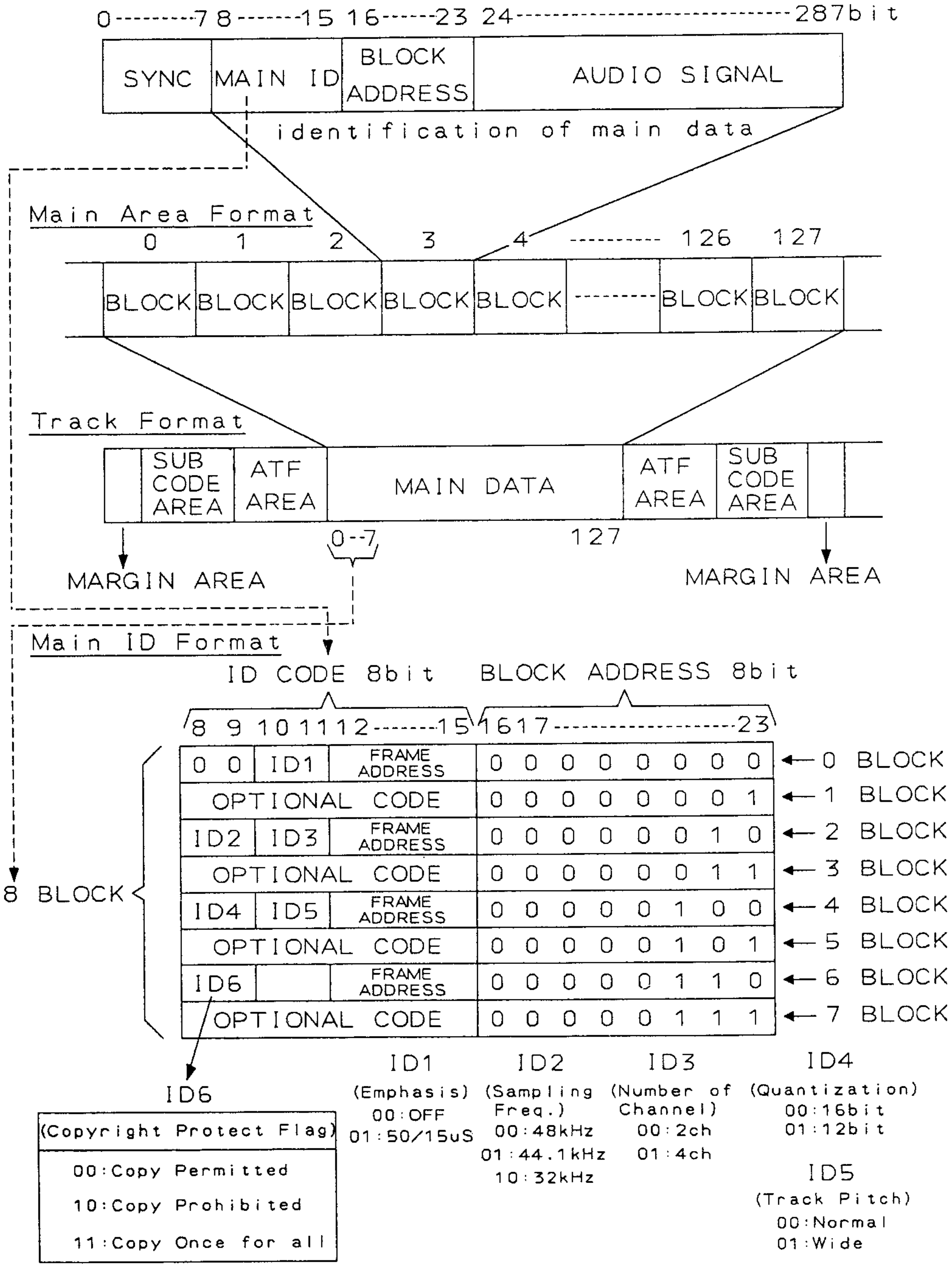

0---------7 8-------15 16------23 24---------------------------287bit
SYNC
MAIN ID
BLOCK ADDRESS
AUDIO SIGNAL
identification of main data
Main Area Format
0
1
2
3
4
126
127
BLOCK
Track Format
SUB CODE AREA
ATF AREA
MAIN DATA
ATF AREA
SUB CODE AREA
0--7
127
MARGIN AREA
MARGIN AREA
Main ID Format
ID CODE 8bit
BLOCK ADDRESS 8bit
8 9 10 11 12-------15 16 17-----------------23
0 0 | ID1 | FRAME ADDRESS | 0 0 0 0 0 0 0 0 ←0 BLOCK
OPTIONAL CODE | 0 0 0 0 0 0 0 1 ←1 BLOCK
ID2 | ID3 | FRAME ADDRESS | 0 0 0 0 0 0 1 0 ←2 BLOCK
OPTIONAL CODE | 0 0 0 0 0 0 1 1 ←3 BLOCK
ID4 | ID5 | FRAME ADDRESS | 0 0 0 0 0 1 0 0 ←4 BLOCK
OPTIONAL CODE | 0 0 0 0 0 1 0 1 ←5 BLOCK
ID6 | | FRAME ADDRESS | 0 0 0 0 0 1 1 0 ←6 BLOCK
OPTIONAL CODE | 0 0 0 0 0 1 1 1 ←7 BLOCK
8 BLOCK
ID6
(Copyright Protect Flag)
00:Copy Permitted
10:Copy Prohibited
11:Copy Once for all
ID1
(Emphasis)
00:OFF
01:50/15uS
ID2
(Sampling Freq.)
00:48kHz
01:44.1kHz
10:32kHz
ID3
(Number of Channel)
00:2ch
01:4ch
ID4
(Quantization)
00:16bit
01:12bit
ID5
(Track Pitch)
00:Normal
01:Wide

Fig. 2 DAT Recording Format

The copy prohibit bit within the subframe format of the digital I/O format assumes the setting (copy prohibited "0" and copy permitted "1") within the channel status. The category code defines General (00000000), Main Processor (01000000), CD Player (10000000), DAT (11000000), or the new DAT-P (11000001). Accordingly, digital audio tapes without copyrights and DAT music tapes have been separated (see Fig. 3).

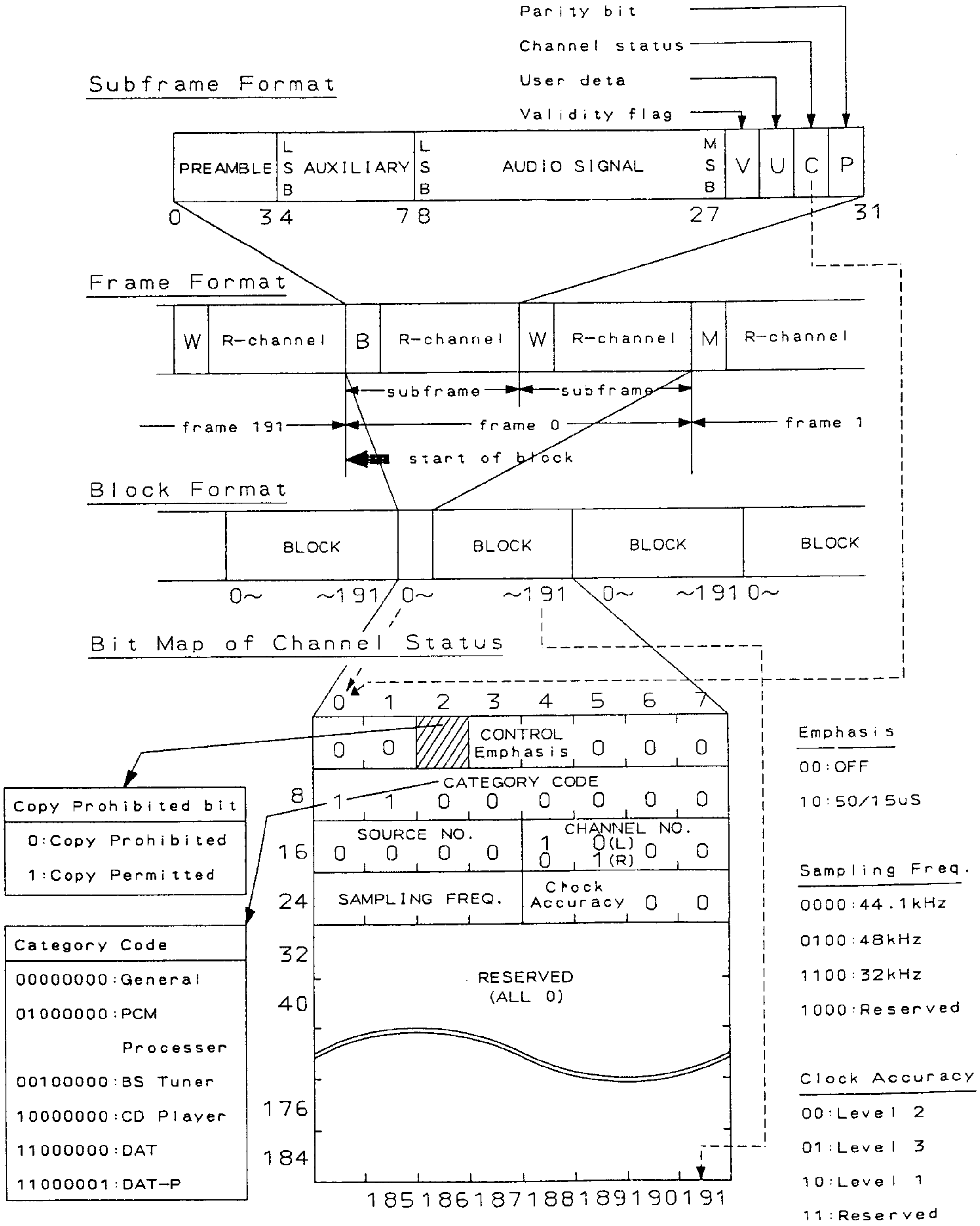

Subframe Format
Parity bit
Channel status
User deta
Validity flag
PREAMBLE
LSB
AUXILIARY
LSB
AUDIO SIGNAL
MSB
V
U
C
P
0
3 4
7 8
27
31
Frame Format
W
R-channel
B
R-channel
W
R-channel
M
R-channel
subframe
subframe
frame 191
frame 0
frame 1
start of block
Block Format
BLOCK
BLOCK
BLOCK
BLOCK
0~
~191
0~
~191
0~
~191 0~
Bit Map of Channel Status
0 1 2 3 4 5 6 7
CONTROL
Emphasis
0 0 0 0 0
8
CATEGORY CODE
1 1 0 0 0 0 0 0
16
SOURCE NO.
0 0 0 0
CHANNEL NO.
1 0 0(L)
0 1 1(R) 0 0
24
SAMPLING FREQ.
Clock Accuracy
0 0
32
40
RESERVED (ALL 0)
176
184
185 186 187 188 189 190 191
Copy Prohibited bit
0:Copy Prohibited
1:Copy Permitted
Category Code
00000000:General
01000000:PCM Processer
00100000:BS Tuner
10000000:CD Player
11000000:DAT
11000001:DAT-P
Emphasis
00:OFF
10:50/15uS
Sampling Freq.
0000:44.1kHz
0100:48kHz
1100:32kHz
1000:Reserved
Clock Accuracy
00:Level 2
01:Level 3
10:Level 1
11:Reserved

Fig. 3 Digital-Audio Interface

Using a compact disc (CD) as an example, the copy prohibit bit of the CD digital output signal is "0" (copy prohibit). "10000000" is output because the category code is "CD Player", and this code is input to the DAT.

Copy is prohibited at this time because the copy prohibit bit is "0", but recording is possible because the category code is "CD". The copy prohibit code of "10" is recorded on the tape in ID6 when the DAT records this code. Then, the copy prohibit bit of the DAT's digital output is "0", and the category code changes to "11000000". Attempts to record this tape to another DAT will fail because the copy prohibit bit is "0" and the category code is "DAT". The copy prohibit bit is generally "1" for broadcast satellite (BS) tuners and the copy prohibit code of the DAT is "00". Therefore, digital copy is possible any number of times, regardless of the category code. The copy prohibit bit is "0" for DAT music tapes and the category code is "11000001" (DAT-P). Therefore, digital copy can be accomplished only once like CD's.

The products which output the general category have copy prohibit bits of "0" and "1" and the category code is "00000000". Therefore, "11" is recorded on the digital audio tape and digital copy is possible twice. When there are analog input signals, "11" is recorded on the digital audio tape. Therefore, digital copy from an analog source is possible twice (see Fig. 4).

Product Item		CD	DAT Music Tape	BS Tuner	General Category	Analog Input (CD, DAT, BS Tuner)	Number of Times
Digital Input	Copy Prohibit Bit	0	0	1	0 or 1	———	
	Category Code	10000000	11000001	00100000	00000000	———	
		⇩	⇩	⇩	⇩	⇩	
When Recording	Copy Prohibit Code (ID6)	10	10	00	11	11	1st Time
		⇩	⇩	⇩	⇩	⇩	
Digital Output	Copy Prohibit Bit	0	0	1	0	0	
	Category Code	11000000	11000000	11000000	11000001	11000001	
		⇩	⇩	⇩	⇩	⇩	
When Recording	Copy Prohibit Code	Copy Impossible	Copy Impossible	00	10	10	2nd Time
				⇩	⇩	⇩	
Digital I/O	Copy Prohibit Bit	———	———	1	0	0	
	Category Code	———	———	11000000	11000000	11000000	
				⇩	⇩	⇩	
When Recording	Copy Prohibit Code	———	———	00 (possible any number of times)	Copy Impossible	Copy Impossible	3rd Time

Fig. 4 Code Transition Table by Product Item

3. TROUBLESHOOTING

Symptom	Cause	Remedy
1. Power is not turned ON.	① Fuse FU1 has blown. ② Fusible resistor R500 has blown. ③ CN13 is disconnected.	
2. Power is turned ON, but the FL display has a failure.	① CN13 is disconnected. ② Crystal resonator X502 (49MHz) is not oscillating. ③ IC503 is not reset during power ON. ④ IC1201 is not operating.	→ Check the signal is input to IC501 pin64. → Check IC503 pin32 ("L" during power ON).
3. Cassette tray is not open/closed.	① Cassette installation unit does not correctly engage with the door section. ② Motor is not rotating. ③ Motor is rotating reverse. ④ IC508 is faulty.	→ Check CN07. → ● Check IC508. ● Check SW2001 and SW2002 of the cassette installation unit. → Check IC508.
4. Tape is not loaded.	① Cassette tape is not detected. ② END sensor is faulty. ③ Check for dust in the mechanical arm section. ④ Motor is not rotating. ⑤ IC508 is faulty.	→ ● Check CN05. ● Check S101 in the mechanical system section. → Check CN19-5 is 1.6Vp-p or less while the cassette tape is loaded. → Check CN06 → Check IC508
5. Drum cannot be controlled.	① Connectors are disconnected. ② IC503 is not operating. ③ IC506 is faulty.	→ Check CN03. → ● Check IC503 is reset during power ON (pin32). ● Check the clock signal (9.4MHz) is input to pins 35 and 61. → Check IC506.
6. Tape stops with error indication.	① Tape is caught due to condensation. 《Error during playback》 ① Capstan rotates, but the reel does not. ② IC503 does not detect the reel FG (RFGT-pin55). ③ Drum FG (D-FG) has a failure. 《Error in the tape top section》 ① Tape top sensor is faulty. 《Other》 ① Mechanical system section has a failure.	→ Mechanical system section has a failure. → ● Check CN05. ● Check the RFGS and RFGT amplifier circuit sections. → Check the D-FG generating circuit sections, IC509 and IC510. → Check CN19-4 is 1.7Vp-p or more in the tape top section. → Replace the mechanical system section.

Symptom	Cause	Remedy
7. Playback cannot be performed.	《Neither level meter nor A – Time are displayed or sound is interrupted.》 ① Head cannot read correctly. Check the RF waveform. ② ATF is not activated. ③ Drum servo is not locked. 《Only fs = 44.1kHz is not reproduced.》 ① Crystal resonator X901 (22MHz) is not oscillating. 《Level meter is active, but no sound is generated.》 ① IC904 and IC907 are faulty.	→ Clean the head with the head cleaning tape. → ● Check CN08. ● Check the D – FG and C – FG. → ● Check IC503 pin60 DREF inputs the signal. ● Check D – PG. ● Check X501 (18MHz) is oscillating.
8. Data can be reproduced, but cannot be recorded.	《Analog recording》 ① Connectors are disconnected. ② IC903 is faulty 《Digital recording》 ① Check data is input to IC501. ② PLL is not operating.	→ Check CN15 and CN16. → Check IC903. → Check data is input to IC501 pin52 Rx. → Check the clock signal is input to IC501 pin48 PLCo. Check for oscillation output on IC517 pin12.
9. Other failure or failure by unknown cause.	① Check the waveform of each section listed in the service manual. ② Adjust the waveform.	

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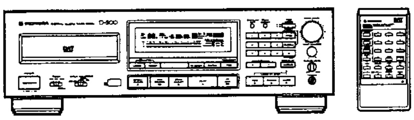
Service Manual



ORDER NO.
ARP2336

DIGITAL AUDIO TAPE DECK

D-500

- This manual is applicable to the D – 500/HEM type.
- As to the circuit description, refer to the D – 500 service guide (ARP2338).
- Ce manuel pour le service comprend les explications de réglage en français.
- Este manual de servicio trata del método ajuste escrito en español.

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DG SEPT. 1991 Printed in Japan

1. EXPLODED VIEWS, PACKING AND PARTS LIST

NOTES:

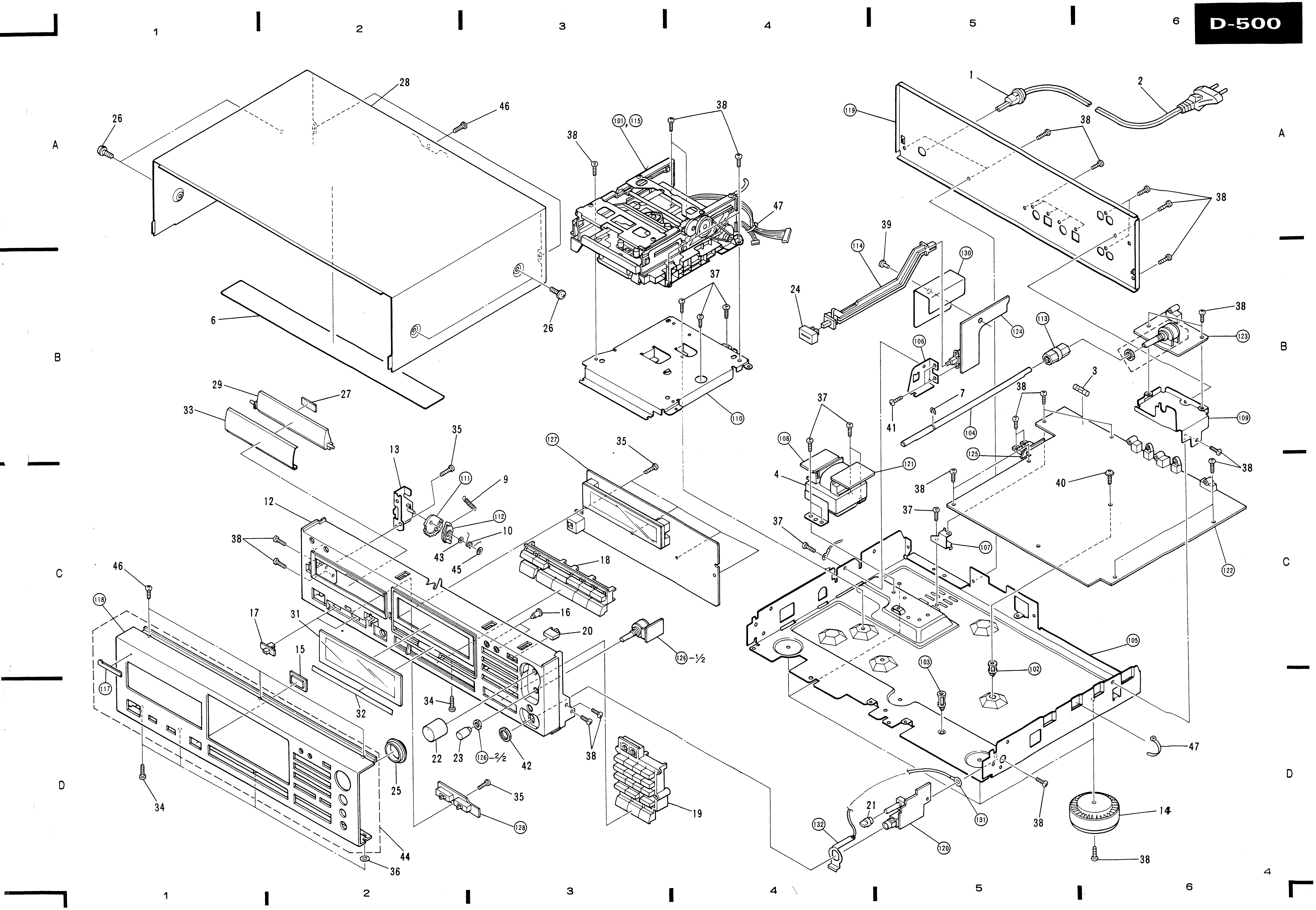
- *The parts with an encircled number are generally unavailable because they are not in our Master Spare Parts List.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*

1.1 EXTERIOR

Parts list of Exterior

Mark	No.	Description	Parts No.
⚠	1	Strain relief	CM－22B
⚠	2	AC Power cord	PDG1003
⚠	3	Fuse (2.5A, FU1)	REK－104
⚠	4	Power transformer	RTT1177
	5	··················	
	6	Damper plate B	PNB1109
	7	Washer	RBF1019
	8	··················	
	9	Arm spring	RBH1143
	10	Gear spring	RBH1191
	11	··················	
	12	Panel stay	RNT1115
	13	Door bracket assembly	RXA1383
	14	Leg assembly	AMR1159
	15	Sensor window	PNW1075
	16	Counter reset knob	RAA1009
	17	Slide SW knob	RAC1562
	18	Function knob A	RAC1622
	19	Function knob B	RAC1623
	20	Push knob	RAC1621
	21	Headphone knob	RAC1620
	22	VR knob A	RAC1430
	23	VR knob B	RAC1421
	24	Power button	PNW1580
	25	VR escutcheon	RAT1009
	26	Screw	FBT40P080FZK
	27	Door stabilizer	REB1122
	28	Bonnet	RNA1463
	29	Door mold	RNK1737
	30	··················	
	31	Display panel	RAH1743
	32	Function panel	RAH1900
	33	Door panel	RAH1901
	34	Screw	BBT30P100FZK
	35	Screw	BBZ26P080FZK
	36	Washer A	REC1111
	37	Screw	BBZ30P060FCC
	38	Screw	BBZ30P080FCC
	39	Rivet	VEC－143
	40	Screw	IBZ30P150FCU
	41	Screw	BMZ30P040FCU
	42	Nut	RBN－006
	43	Washer	WT21D050D050
	44	Front panel assembly	RXX1432
	45	Washer	WT21D070D050

Mark	No.	Description	Parts No.
	46	Screw	BBT30P080FCC
	47	Binder	REC－371
	101	DAT Mechanical unit	EXK2502
	102	PCB spacer	PNY－404
	103	PCB holder	REC1036
	104	VR shaft	RLA1161
	105	Main chassis	RNB1053
	106	AC－SW holder	RNE1176
	107	PCB holder	RNE1330
	108	Trans A PCB	
	109	VR shield plate	RNE1418
	110	Mecha stay	RNE1419
	111	Gear	RNK1289
	112	Arm	RNK1290
	113	Joint	RNK1333
	114	AC－SW joint	RNK1677
	115	Cassette installation unit	RXA1355
	116	··················	
	117	Name plate	PAN1035
	118	Front panel	RAH1899
	119	Rear panel	RNA1464
	120	Headphone unit	RWZ2443
	121	Trans B unit	RWZ2444
	122	Main unit	RWZ2445
	123	Master VR unit	RWZ2446
⚠	124	ACSW unit	RWZ2447
	125	IC unit	RWZ2448
	126	Balance VR unit	RWZ2449
	127	Operation/Display unit	RWZ1945
	128	Timer switch unit	RWZ1946
	129	Capacitor sleeve A	REC－150
	130	AC－SW Cover	REC1107
	131	Earth lead ass'y	RDF1108
	132	Earth plate	PNE1481


A
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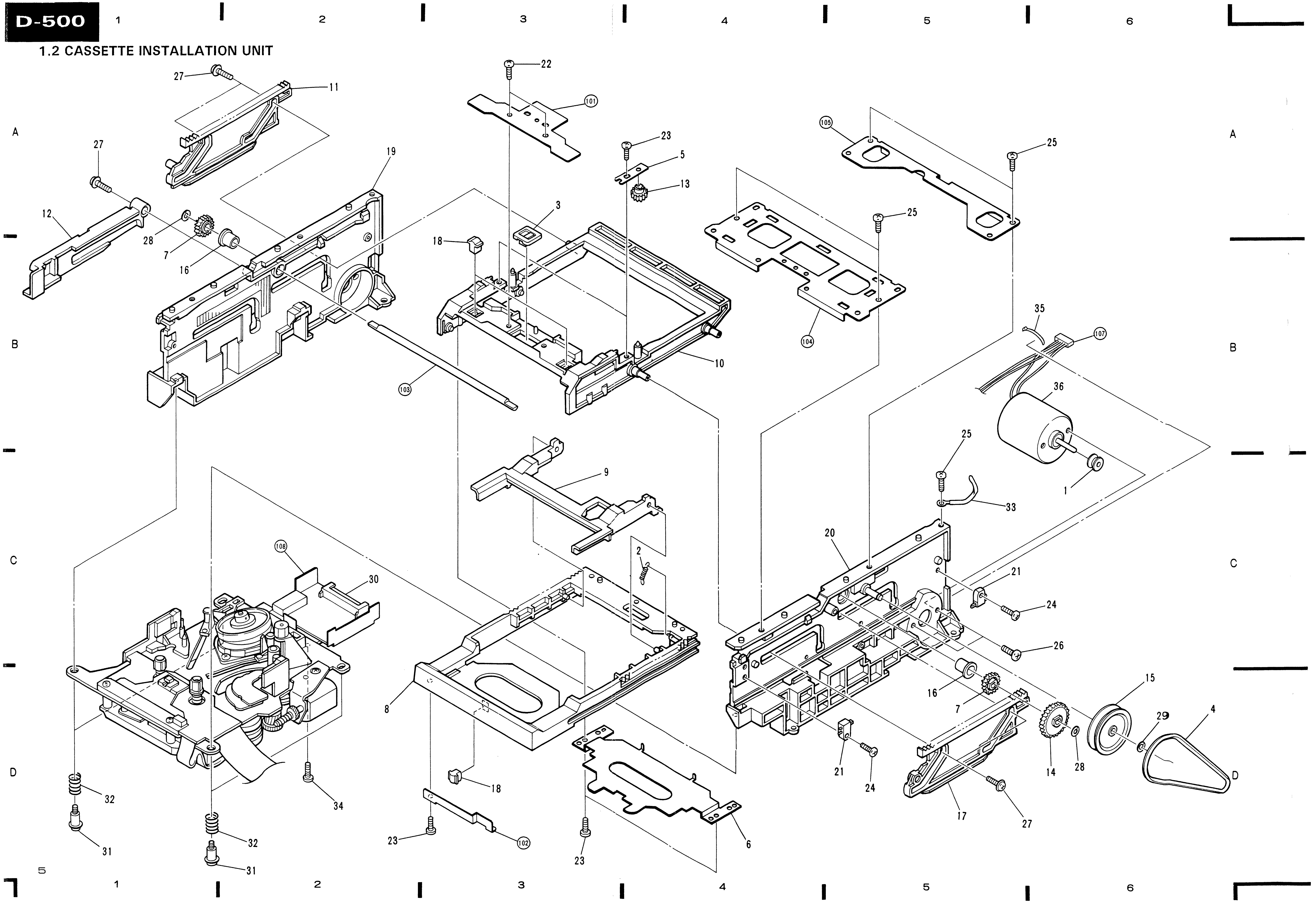
126-2/2

1.2 CASSETTE INSTALLATION UNIT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32
34
18
32
31
23
102
6
23
31

Parts list of Cassette Installation Unit

Mark	No.	Description	Parts No.
	1	Motor pulley	PNW1634
	2	Spring	RBH1279
	3	Half damper	REB1033
	4	Belt	REB1140
	5	Gear stopper	RNE1394
	6	Container plate	RNE1395
	7	Gear	RNK1272
	8	Tray	RNK1648
	9	Flap	RNK1649
	10	Container	RNK1650
	11	Main rack plate L	RNK1653
	12	Lever	RNK1657
	13	Gear	RNK1658
	14	Gear A	RNK1659
	15	Pulley gear	RNK1660
	16	Collar	RNK1661
	17	Main rack plate R	RNK1664
	18	Half set	RNK1711
	19	Side plate L assembly	RXA1356
	20	Side plate R assembly	RXA1357
	21	Push switch (S2001, 2002)	RSF1008
	22	Screw	BBZ20P040FMC
	23	Screw	BBZ20P060FZK
	24	Screw	BBZ20P080FMC
	25	Screw	BBZ26P060FMC
	26	Screw	BMZ30P040FMC
	27	Screw	PBA1035
	28	Washer	WT21D050D025
	29	Washer	WT26D047D050
◉	30	RF unit	RWX1040
	31	Screw	PBA1002
	32	Spring	RBH1125
	33	Clamper	RNH−184
	34	Screw	BMZ20P040FMC
	35	Binder	REC−371
	36	Loading motor	VXM1034

Mark	No.	Description	Parts No.
	101	Half set spring	RBK1035
	102	Tray spring	RBK1036
	103	Shaft	RLA1152
	104	Top plate	RNE1396
	105	Rear stay	RNE1397
	106	....	
	107	Connector assembly (6P)	RKP1433
	108	Lower shield case	RNE1401

1.3 DAT MECHANICAL UNIT

Parts list of DAT Mechanism Unit

Mark	No.	Description	Parts No.
	1	Clamper	HEF-102
	2	....	
	3	....	
	4	Switch (S101)	ESG1001
	5	Encoder	ESX1001
	6	Motor	CXM1020
	7	Solenoid	EXP1007
	8	Photo reflector (Q101,Q102)	GP2S04
	9	Photo reflector assembly	EXX1023
	10	Photo reflector assembly	EXX1022
	11	Resistor (R101)	RD1/4PM431J
	12	Drum assembly	EXH9003
	13	Bracket assembly	EXA1117
	14	Arm assembly	EXA1118
	15	Arm assembly	EXA1119
	16	Arm assembly	EXA1122
	17	Gear assembly	EXA1123
	18	Arm assembly	EXA1124
	19	Reel base assembly	EXA1125
	20	Tape guide	EXA1129
	21	Bracket assembly	EXA1184
	22	Band assembly	EXA1185
	23	Plate	ENE1006
	24	Bracket	ENV1236
	25	Stabilizer	ENV1192
	26	Lever	ENV1194
	27	Brake	ENV1195
	28	Arm	ENV1197
	29	Gear	ENV1251
	30	Hub	ENV1252
	31	Gear	ENV1253
	32	Wheel	ENV1254
	33	Gear	ENV1255
	34	Arm	ENV1256
	35	Lever	ENV1257
	36	Plate	ENV1258
	37	Lever	ENV1259
	38	Brake	ENV1260
	39	Gear	ENV1231
	40	Gear	ENV1232
	41	Wheel	ENV1233
	42	Gear	ENV1234
	43	Cam	ENV1235
	44	Gear	ENV1238
	45	Plate	ENV1239
	46	Brake	ENV1240
	47	Arm	ENV1241
	48	Gear	ENV1242
	49	Arm	ENV1243
	50	Arm	ENV1244
	51	Link	ENV1245
	52	Link	ENV1246
	53	Slider	ENV1247
	54	Slider	ENV1248
	55	Pinch roller	ENT1016
	56	Belt	ENT1017
	57	Tape guide	ELA2025
	58	Tape guide	ELA2022
	59	Earth spring	EBL1004
	60	Washer	EBF1014
	61	Sheet	EEF1001
	62	Felt	ENM1019
	63	Damper	ENT1021
	64	Tape guide	ENV1282
	65	Brake shou	ENT1022
	66	Motor unit	EXH9002
	67	Spring	EBH1236
	68	Spring	EBH1237
	69	Spring	EBH1222
	70	Spring	EBH1223
	71	Spring	EBH1224
	72	Spring	EBH1226
	73	Spring	EBH1227
	74	Spring	EBH1228
	75	Spring	EBH1229
	76	Spring	EBH1230
	77	Spring	EBH1231
	78	Spring	EBH1232
	79	Spring	EBH1233
	80	Spring	EBH1238
	81	Spring	EBH1239
	82	Screw	BBZ20P060FZK
	83	Screw	BMZ20P040FMC
	84	Screw	PMS20P025FMC
	85	Screw	JGZ20P030FMC
	86	Washer	WT16D040D050
	87	Washer	WT16D032D025
	88	Washer	WT10D035D025
	89	Washer	WA16D032D025
	90	Washer	WA16D032D013
	91	Washer	WA20D040D050
	92	Screw	EBA1025
	151	Reel sensor unit	ENP1027
	152	Chassis assembly	EXA1183
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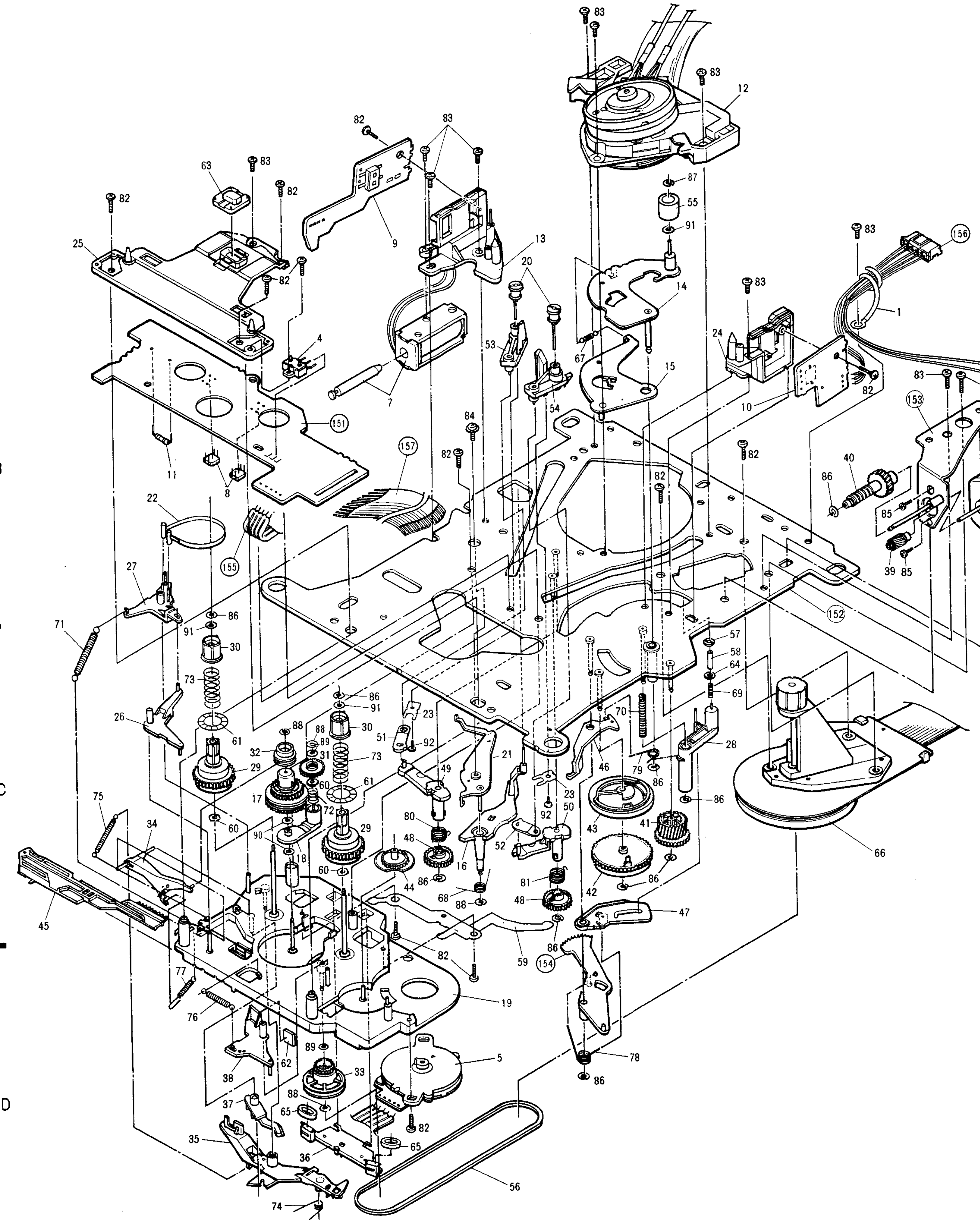
	154	Lever	ENR1014
	155	Cable	EDD1004
	156	Connector	EDE1011
	157	Cable	EDD1006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80
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86
81
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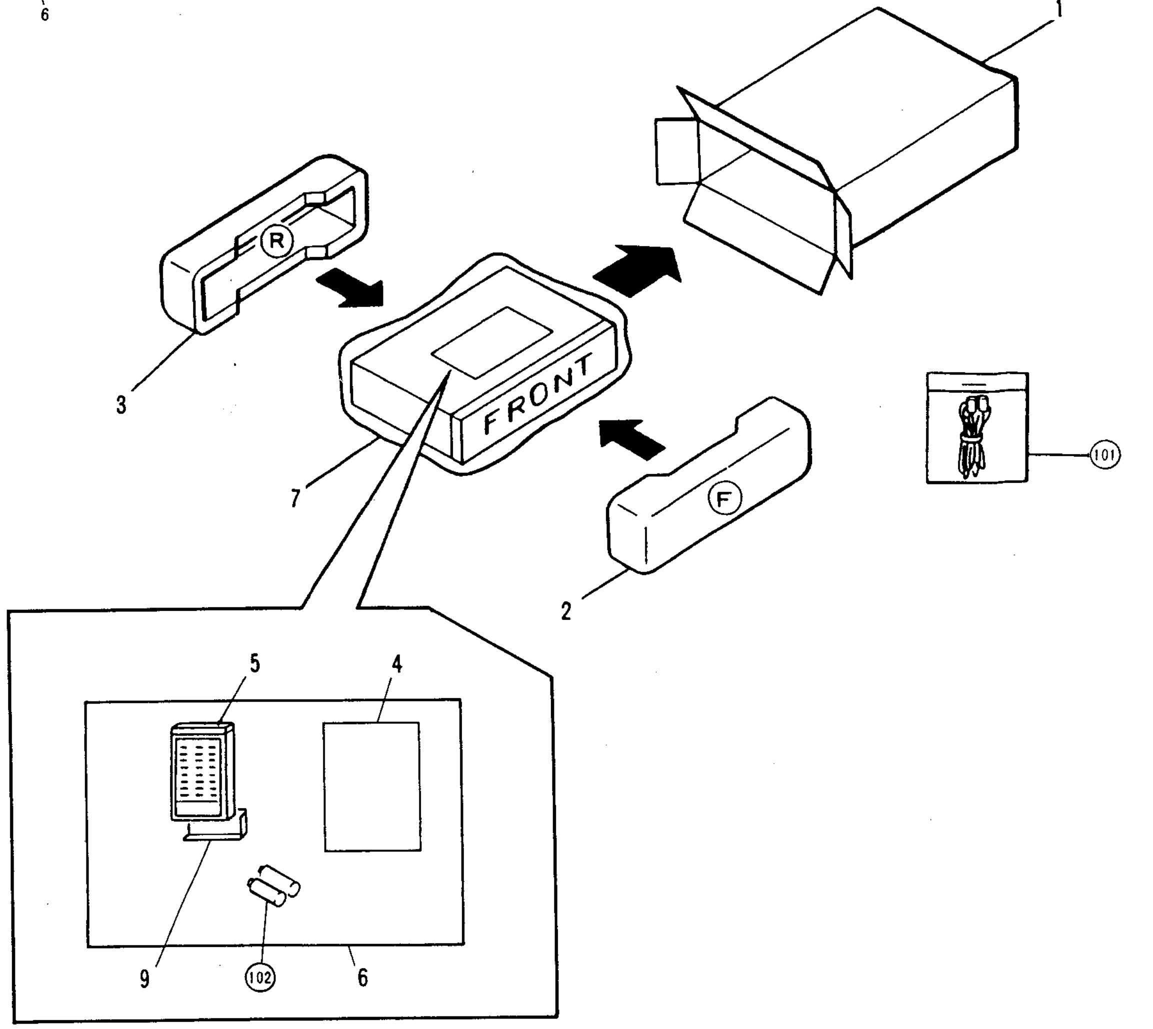
45
68
88
48
47
82
59
86
154
19
77
76
5
89
62
33
78
38
86
37
88
65
82
35
36
65
56
74

1.4 PACKING

Parts list of Packing

Mark	No.	Description	Parts No.
	1	Packing case	RHG1299
	2	Pad (F)	RHA1033
	3	Pad (R)	RHA1034
	4	Operating instructions (English, French, German, Italian)	RRE1048
		Operating instructions (Dutch, Swedish, Spanish, Portugues)	RRD1117
	5	Remote control unit (CU-D003)	RPX1022
	6	Sheet	RHL1001
	7	Packing sheet	RHX-034
	8	....	
	9	Case (C)	VNK1598
	101	Connection cord assembly	RDE1002
	102	Dry cell battery (R03)	VEM-022


1
R
3
FRONT
7
F
2
101
5
4
9
102
6

2. REMOVING THE DAT MECHANICAL UNIT

1. Remove the bonnet cover.
2. Disconnect the flexible PCB from connectors CN03 to CN05 and the connectors from connectors CN06, CN07, and J2.
   Remove the wire from the transformer by loosening the cord clamp.
3. Remove five screws ① to remove the loading mechanical section. (See Fig. 2-1.)
4. Disconnect connector CN402 from the RF unit, and remove the two flexible PCBs and one wire of the connector from section A.
5. Remove four screws ② and four mechanical mounting springs to remove the DAT mechanical unit. (See Fig. 2-2.)

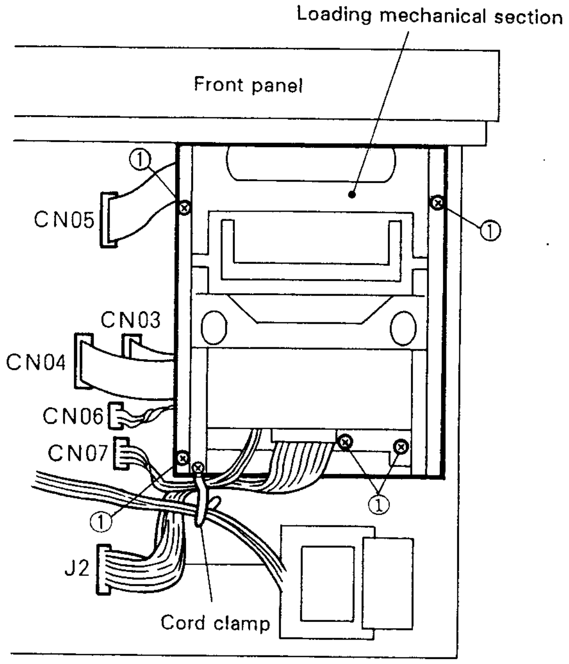

Loading mechanical section
Front panel
①
CN05
①
CN03
CN04
CN06
CN07
①
①
J2
Cord clamp

Fig. 2-1

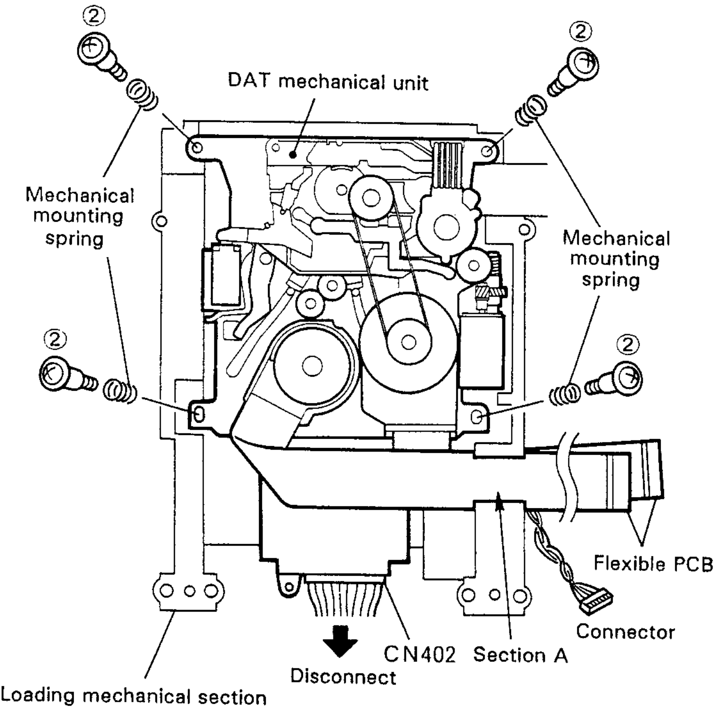

②
②
DAT mechanical unit
Mechanical mounting spring
Mechanical mounting spring
②
②
Flexible PCB
Connector
CN402
Section A
Disconnect
Loading mechanical section

Fig. 2-2

3. REPLACING MAIN PARTS IN THE MECHANICAL SECTION

3.1 REPLACING THE DRUM

<Removing>

1. Cut the wire clamp and disconnect connector CN401.
2. Remove three screws ① to remove the rotating drum assembly.

Note :
Do not touch the outer surface of the drum.

<Re-installing>

1. Use the removal procedure in the reverse sequence. However, be sure to tighten three screws ① counterclockwise starting from position Ⓐ with torque of 1kgcm as shown in Fig. 3-1.

Note :
After replacement, be sure to perform the tape pass adjustment, TACH adjustment, and record current adjustment.

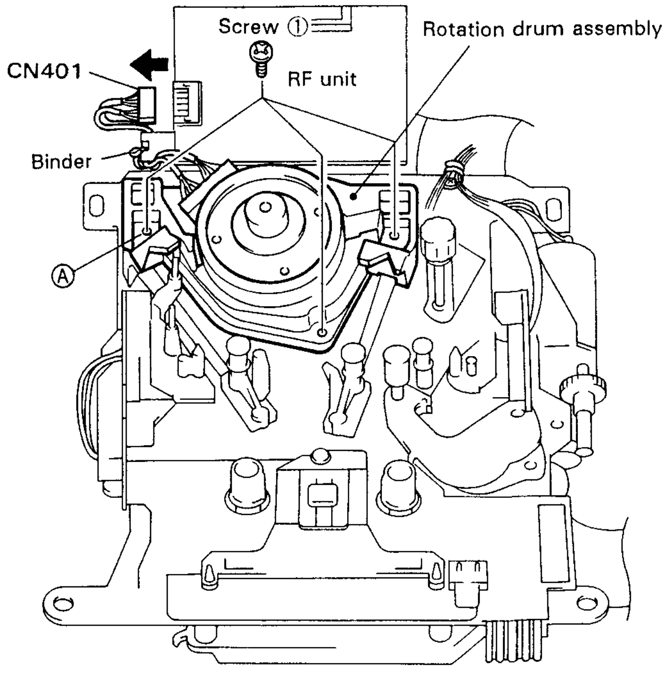

Screw ①
Rotation drum assembly
CN401
RF unit
Binder
Ⓐ

Fig. 3-1

3.2 REPLACING THE CAPSTAN DD MOTOR UNIT

<Removing>

1. Remove rubber belt ①.
2. Remove three screws ② to remove the capstan DD motor unit.

<Re-installing>

1. Use the removal procedure in the reverse sequence.

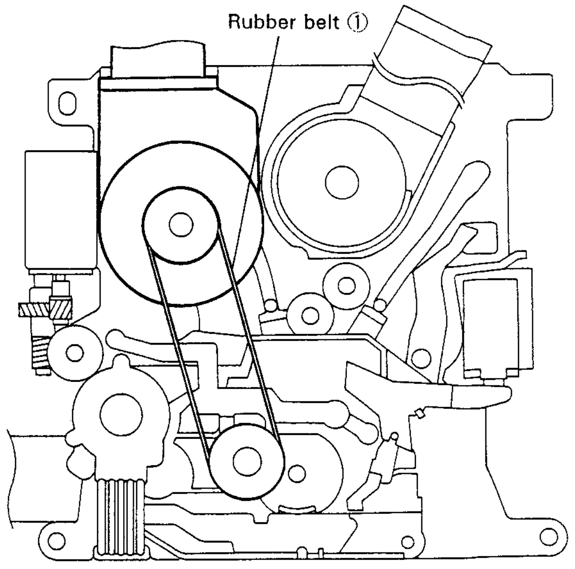

Rubber belt ①

Fig. 3-2

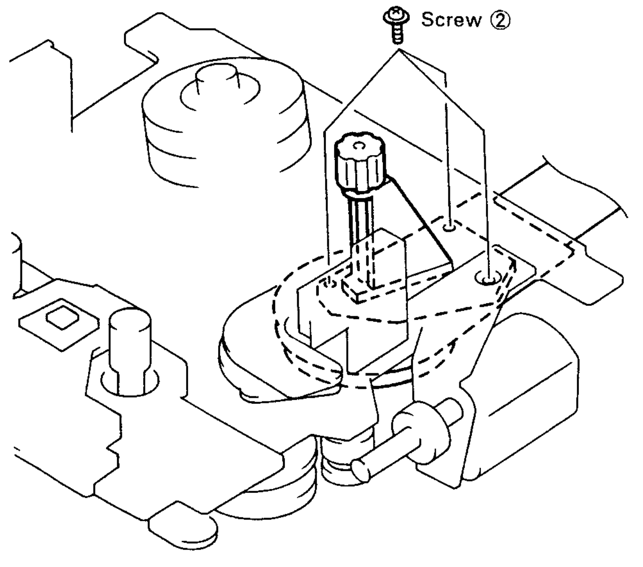


Fig. 3-3

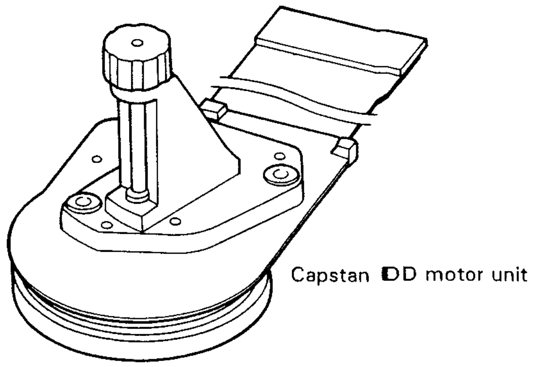
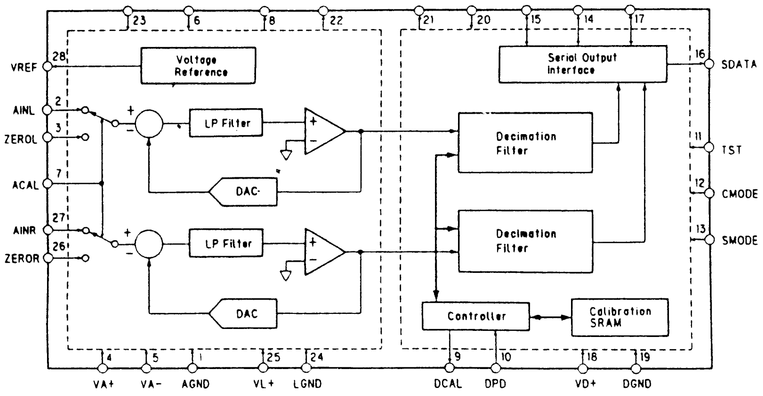

Capstan DD motor unit

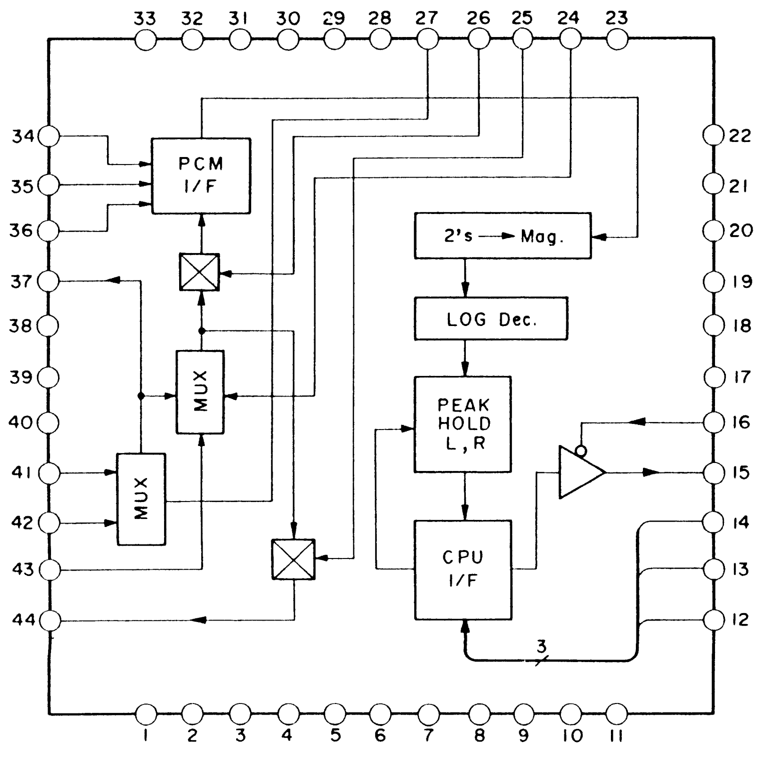
Fig. 3-4

● IC Block Diagram

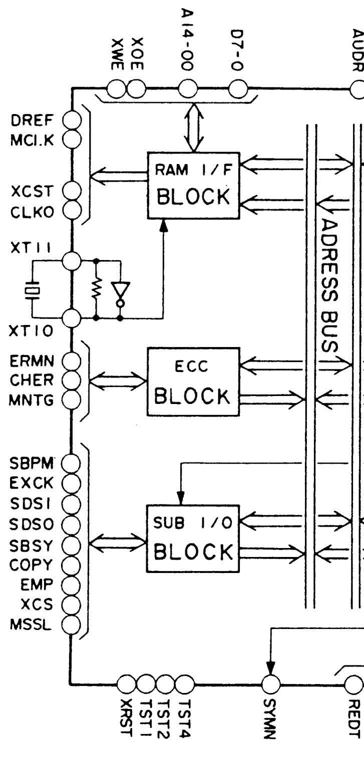
IC903 (CS5339)


ICLK
APD
NC
NC
OCLK
CLK
SCLK
L/R̄
FSYNC
23
6
8
22
21
20
15
14
17
VREF
28
Voltage Reference
Serial Output Interface
16
SDATA
AINL
2
ZEROL
3
LP Filter
Decimation Filter
11
TST
ACAL
7
DAC
12
CMODE
AINR
27
26
ZEROR
LP Filter
Decimation Filter
13
SMODE
DAC
Controller
Calibration SRAM
4
5
1
25
24
9
10
18
19
VA+
VA-
AGND
VL+
LGND
DCAL
DPD
VD+
DGND

IC513 (PD2020)


33 32 31 30 29 28 27 26 25 24 23
34
35
36
37
38
39
40
41
42
43
44
PCM I/F
MUX
MUX
2's → Mag.
LOG Dec.
PEAK HOLD L, R
CPU I/F
3
22
21
20
19
18
17
16
15
14
13
12
1 2 3 4 5 6 7 8 9 10 11

IC


XWE
XOE
A14-0
D7-0
AUDR
DREF
MCLK
XCST
CLKO
XTI I
XTIO
RAM I/F BLOCK
ADRESS BUS
ERMN
CHER
MNTG
ECC BLOCK
SBPM
EXCK
SDSI
SDSO
SBSY
COPY
EMP
XCS
MSSL
SUB I/O BLOCK
XRST
TST1
TST2
TST4
SYMN
REDT

3.3 REPLACING THE PINCH ROLLER

< Removing >

1. Remove the poly-slider washer at the upper section of the pinch roller using the edge of a precision screwdriver.

Note :
Care must be taken to prevent deforming the pinch arm assembly.

< Re-installing >

1. Insert the pinch roller on the pinch arm assembly and press-fit the poly-slider washer to the pinch roller.

Note :
Pay attention to prevent dust (especially, magnetic powder) from adhering to the pinch roller. Use a new poly-slider washer after replacing the pinch roller.

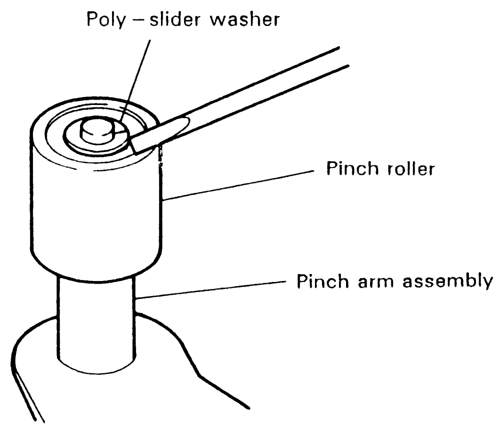

Poly-slider washer
Pinch roller
Pinch arm assembly

Fig. 3-5

3.4 REPLACING THE POWER MOTOR

< Removing >

1. Loosen the clamp to remove the wiring.
2. Remove one screw ① to remove the motor bracket from the chassis.
3. Remove poly-slider washer ② using a screwdriver and extract the worm gear.
4. Remove two screws ③ to remove the power motor.

< Re-installing >

1. Use the removal procedure in the reverse sequence.

Note :
After replacing the motor, be sure to press-fit a new motor gear. Do not change the clamp screw direction.

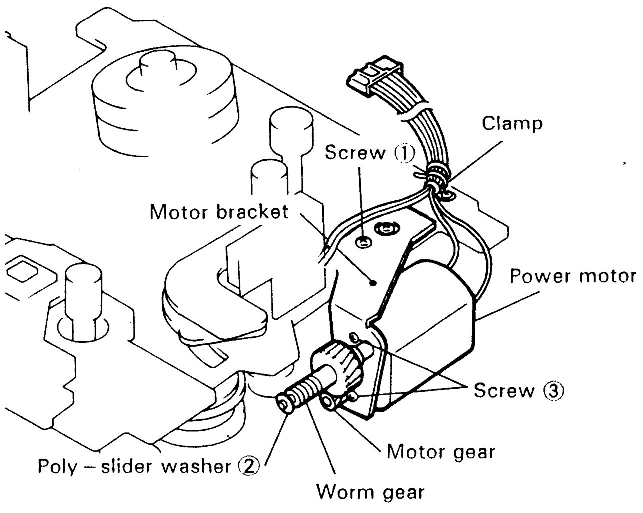

Clamp
Screw ①
Motor bracket
Power motor
Screw ③
Motor gear
Poly-slider washer ②
Worm gear

Fig. 3-6

3.5 REPLACING THE PLUNGER SOLENOID

< Removing >

1. Melt and remove solder Ⓐ connecting the end sensor PCB and reel PCB.
2. Remove one screw ① to remove the end sensor PCB. Melt and remove the solder connecting the solenoid lead wire to the end sensor PCB, and remove the wire from the end sensor PCB.
3. Remove two screws ② to remove the plunger solenoid.

< Re-installing >

1. Use the removal procedure in the reverse sequence.

Note :
After re-installation, press-fit the solenoid to the hook section of the end sensor bracket.

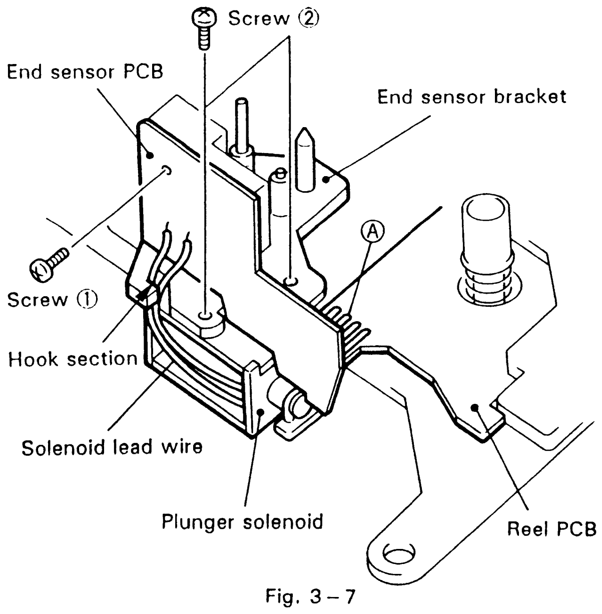

Screw ②
End sensor PCB
End sensor bracket
Ⓐ
Screw ①
Hook section
Solenoid lead wire
Plunger solenoid
Reel PCB

Fig. 3-7

3.6 REMOVING/RE-INSTALLING THE RE

< Removing >

1. Set the mode to unthreading.
2. Remove the rubber belt.
3. Remove one screw ① fixing the encoder.
4. Remove four screws ② to remove the reel assembly.

< Re-installing >

1. Use the removal procedure in the reverse sequence.

Notes :

- *When re-installing the reel base assembly in the chas move the mode plate to the leftmost side viewed from rear side.*
- *When re-installing the encoder, match the convex of encoder shaft to the concave. (See page 15.)*

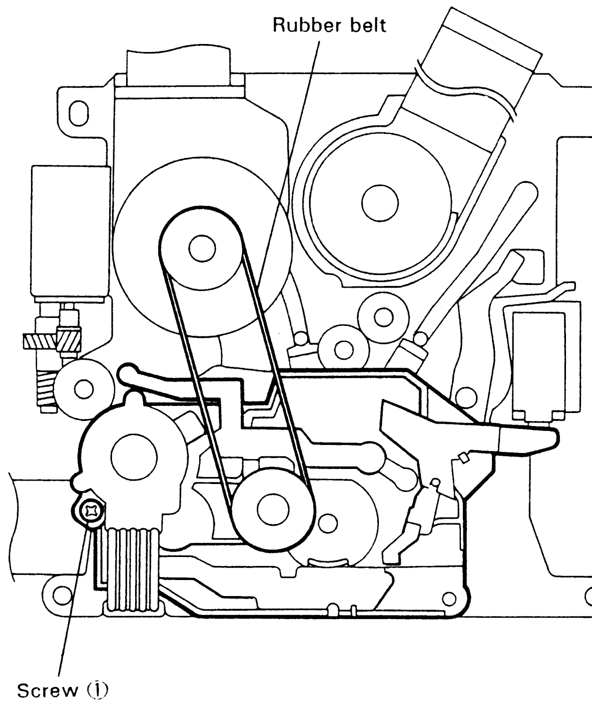
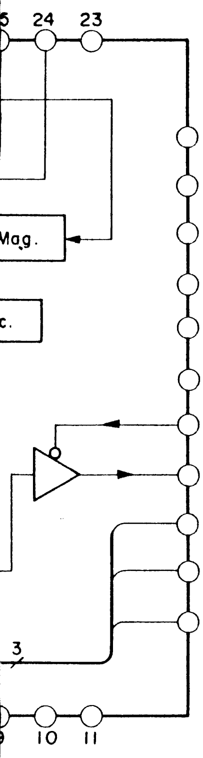
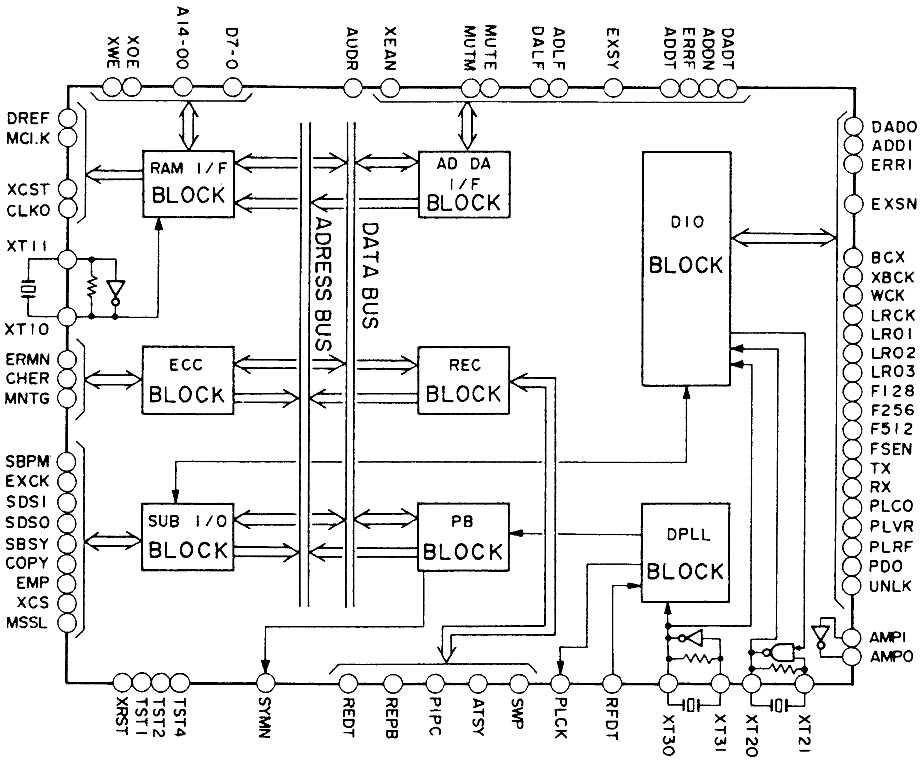

Rubber belt
Screw ①

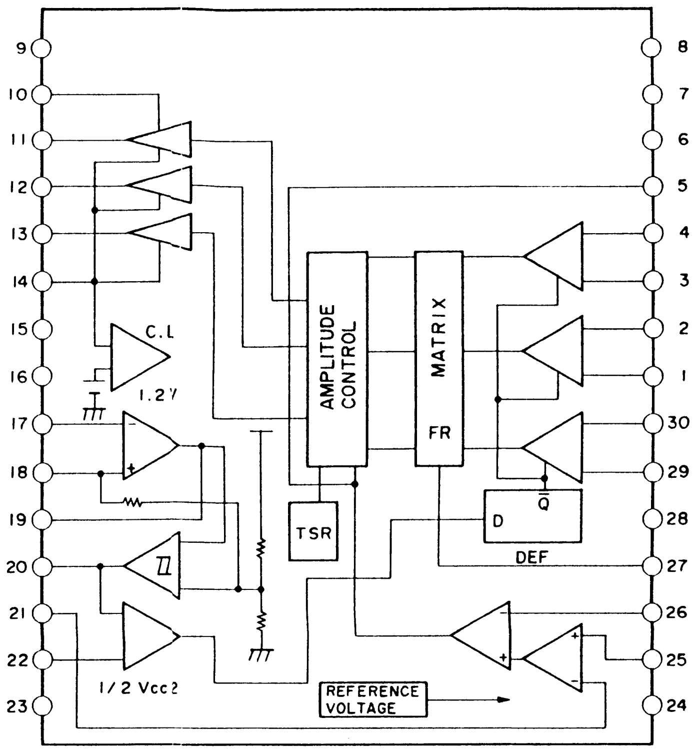
Fig. 3-8

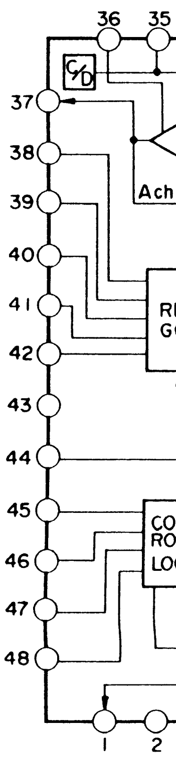

24
23
22
21
20
19
18
17
16
15
14
13
12
Mag.
c.
3
10
11

IC501 (CXD2601AQ)


XWE
XOE
A14-00
D7-0
AUDR
XEAN
MUTM
MUTE
DALF
ADLF
EXSY
ADDT
ERRF
ADDN
DADT
DREF
MCI.K
XCST
CLKO
XT11
XT10
ERMN
CHER
MNTG
SBPM
EXCK
SDSI
SDSO
SBSY
COPY
EMP
XCS
MSSL
RAM I/F BLOCK
AD DA I/F BLOCK
ADRESS BUS
DATA BUS
DIO BLOCK
ECC BLOCK
REC BLOCK
SUB I/O BLOCK
PB BLOCK
DPLL BLOCK
DADO
ADDI
ERRI
EXSN
BCX
XBCK
WCK
LRCK
LRO1
LRO2
LRO3
F128
F256
F512
FSEN
TX
RX
PLCO
PLVR
PLRF
PDO
UNLK
AMPI
AMPO
XRST
TST1
TST2
TST4
SYMN
REDT
REPB
PIPC
ATSY
SWP
PLCK
RFDT
XT30
XT31
XT20
XT21

IC506, IC507 (LB1687)


9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
C.L
1.2V
1/2 Vcc2
AMPLITUDE CONTROL
TSR
MATRIX
FR
D
Q̄
DEF
REFERENCE VOLTAGE
8
7
6
5
4
3
2
1
30
29
28
27
26
25
24


36
35
37
38
39
40
41
42
43
44
45
46
47
48
1
2
Ach
RI
G
CO
RO
LO

3.6 REMOVING/RE-INSTALLING THE REEL BASE ASSEMBLY

<Removing>

1. Set the mode to unthreading.
2. Remove the rubber belt.
3. Remove one screw ① fixing the encoder.
4. Remove four screws ② to remove the reel base assembly.

<Re – installing>

1. Use the removal procedure in the reverse sequence.

Notes :

- *When re-installing the reel base assembly in the chassis, move the mode plate to the leftmost side viewed from the rear side.*
- *When re-installing the encoder, match the convex of the encoder shaft to the concave. (See page 15.)*

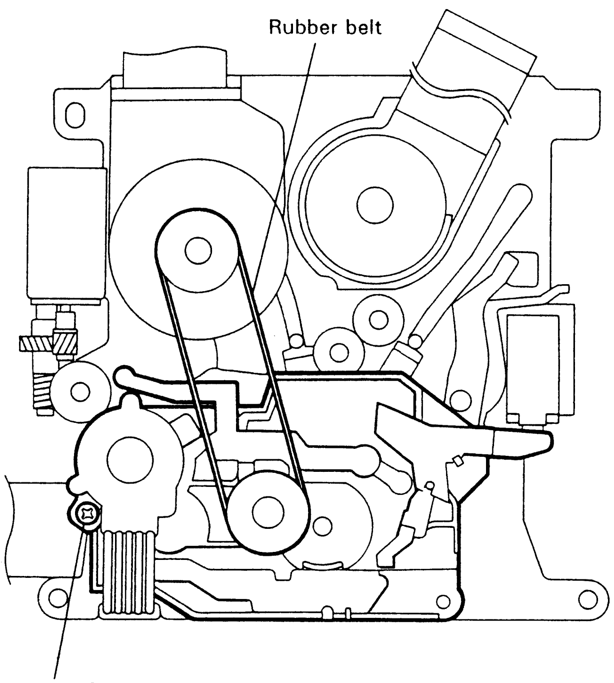

Rubber belt
Screw ①

Fig. 3 – 8

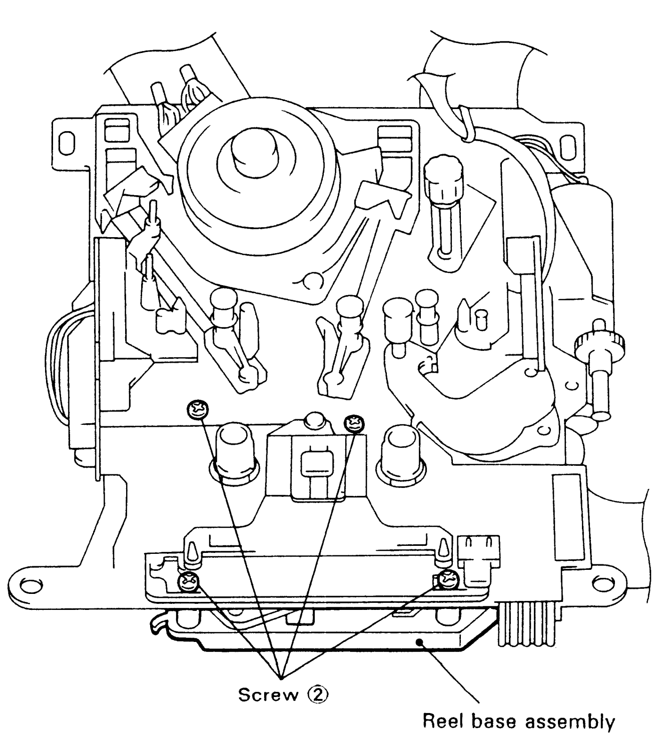

Screw ②
Reel base assembly

Fig. 3 – 9

3.7 ALIGNING THE GEARS

1. Align the gears with care using the mark position on each gear.

Note :

Set the unthreading mode before gear alignment.

Aligning the Interval Gear

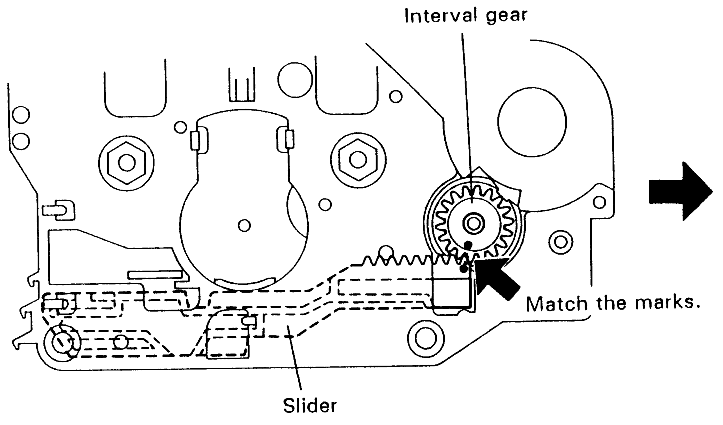

Interval gear
Match the marks.
Slider

Fig. 3 – 1

3.8 NOTE

When tightening the switch screw, care must be taken to prevent giving torque exceeding 1 kg • cm.

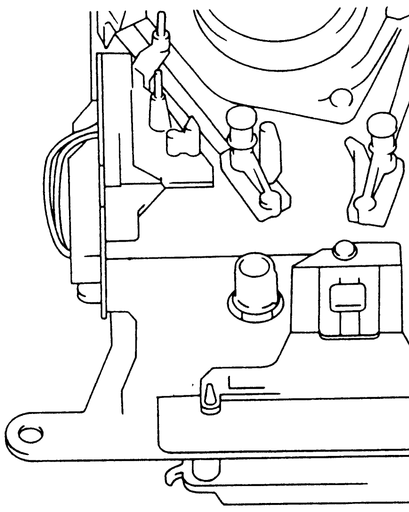
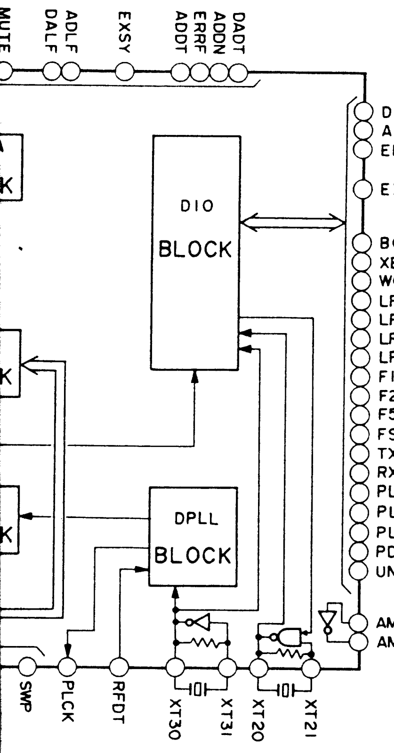
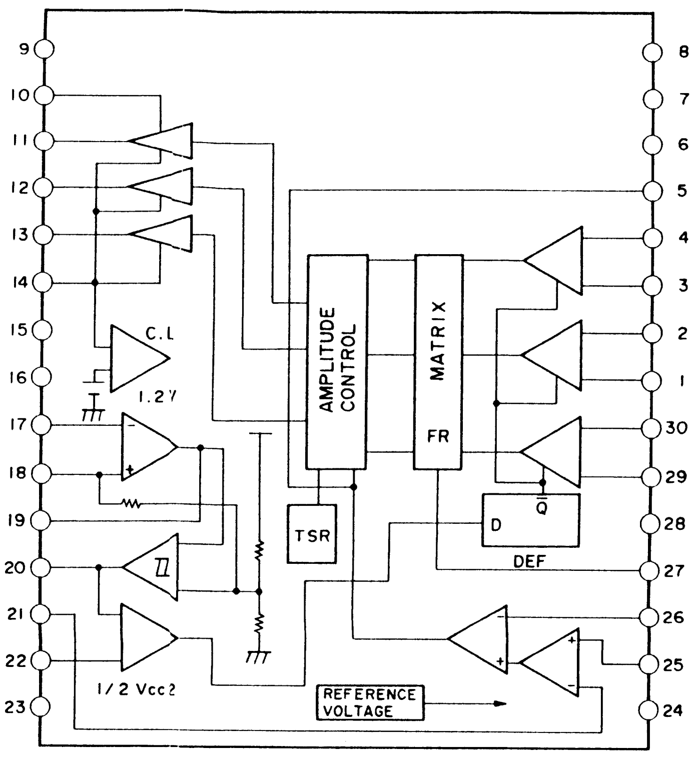


Fig. 3 – 12

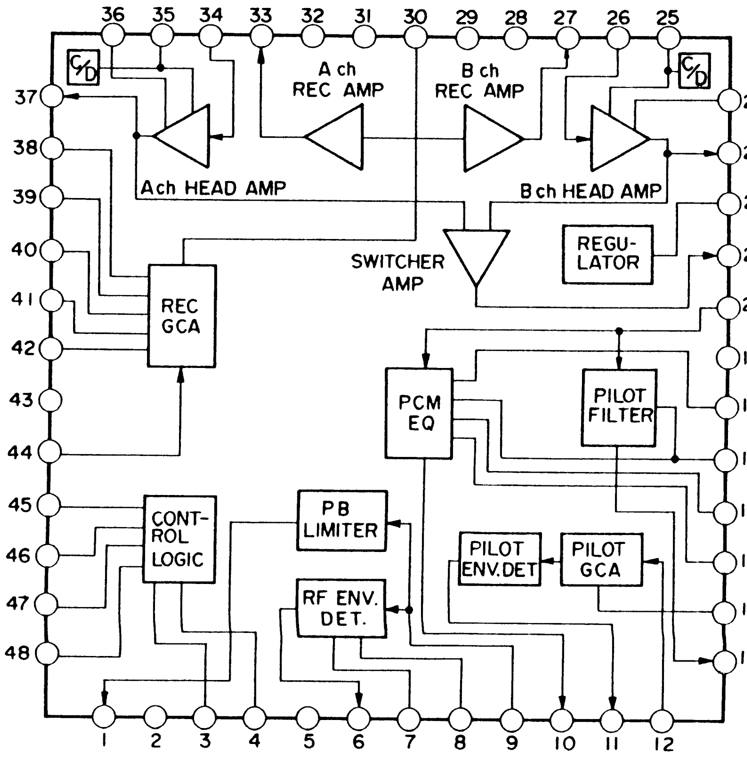
)2601AQ)


ADLF
DALF
EXSY
ADDT
ERRF
ADDN
DADT
DADO
ADDI
ERRI
EXSN
BCX
XBCK
WCK
LRCK
LRO1
LRO2
LRO3
F128
F256
F512
FSEN
TX
RX
PLCO
PLVR
PLRF
PDO
UNLK
AMPI
AMPO
DIO BLOCK
DPLL BLOCK
SWP
PLCK
RFDT
XT30
XT31
XT20
XT21

IC506, IC507 (LB1687)


C.L
1.2V
AMPLITUDE CONTROL
MATRIX
FR
TSR
D
Q
DEF
1/2 Vcc?
REFERENCE VOLTAGE

IC201 (CXA1364R)


A ch REC AMP
B ch REC AMP
Ach HEAD AMP
B ch HEAD AMP
SWITCHER AMP
REGU-LATOR
REC GCA
PCM EQ
PILOT FILTER
CONT-ROL LOGIC
PB LIMITER
PILOT ENV.DET
PILOT GCA
RF ENV. DET.

ASSEMBLY

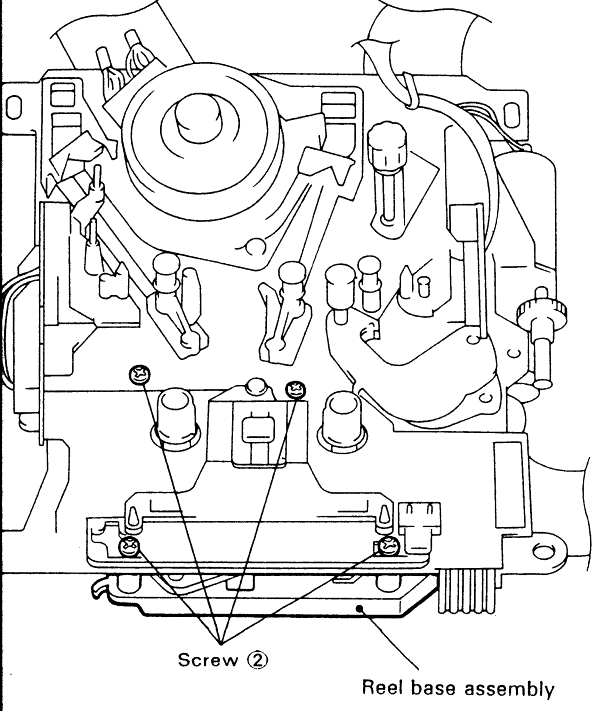

Screw ②
Reel base assembly

Fig. 3－9

3.7 ALIGNING THE GEARS

1. Align the gears with care using the mark position on each gear.

Note :
Set the unthreading mode before gear alignment.

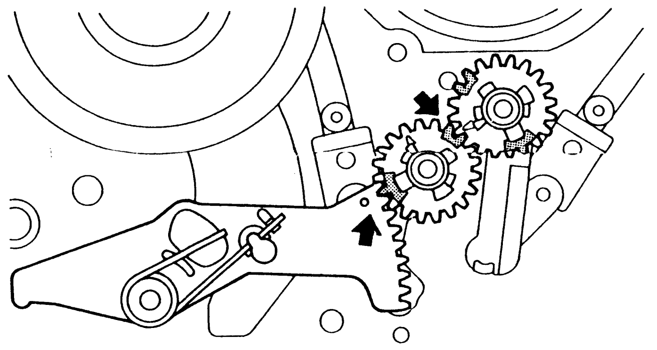
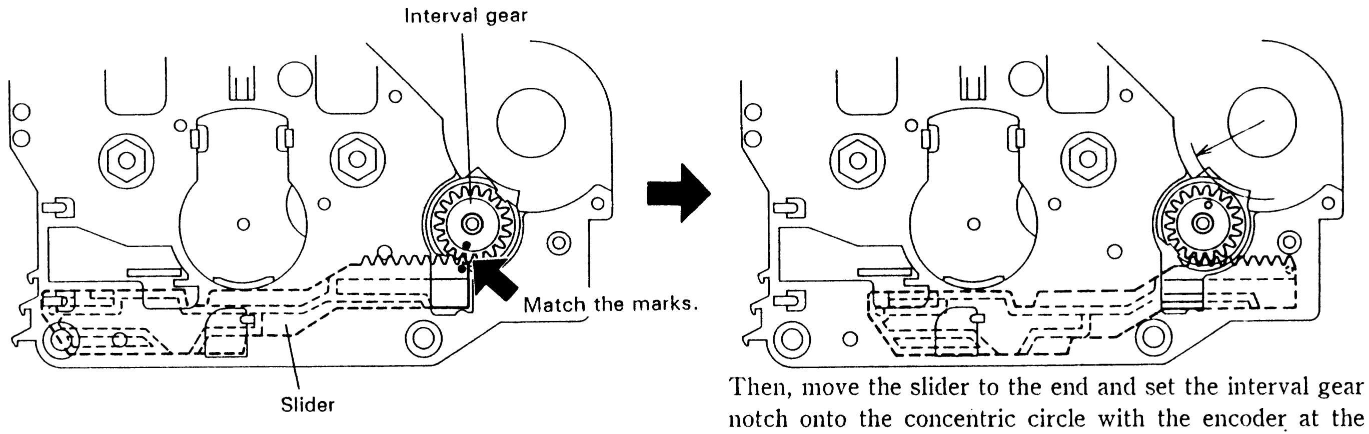


Fig. 3－10

Aligning the Interval Gear


Interval gear
Match the marks.
Slider

Then, move the slider to the end and set the interval gear notch onto the concentric circle with the encoder at the center.

Fig. 3－11

3.8 NOTE

When tightening the switch screw, care must be taken to prevent giving torque exceeding 1 kg • cm.

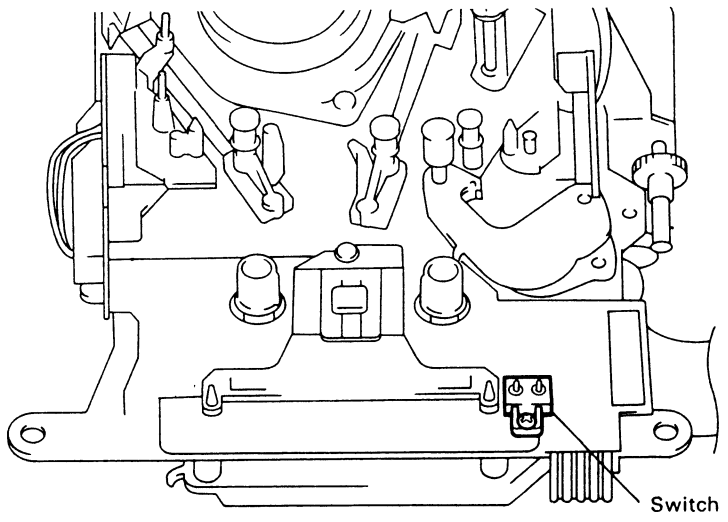
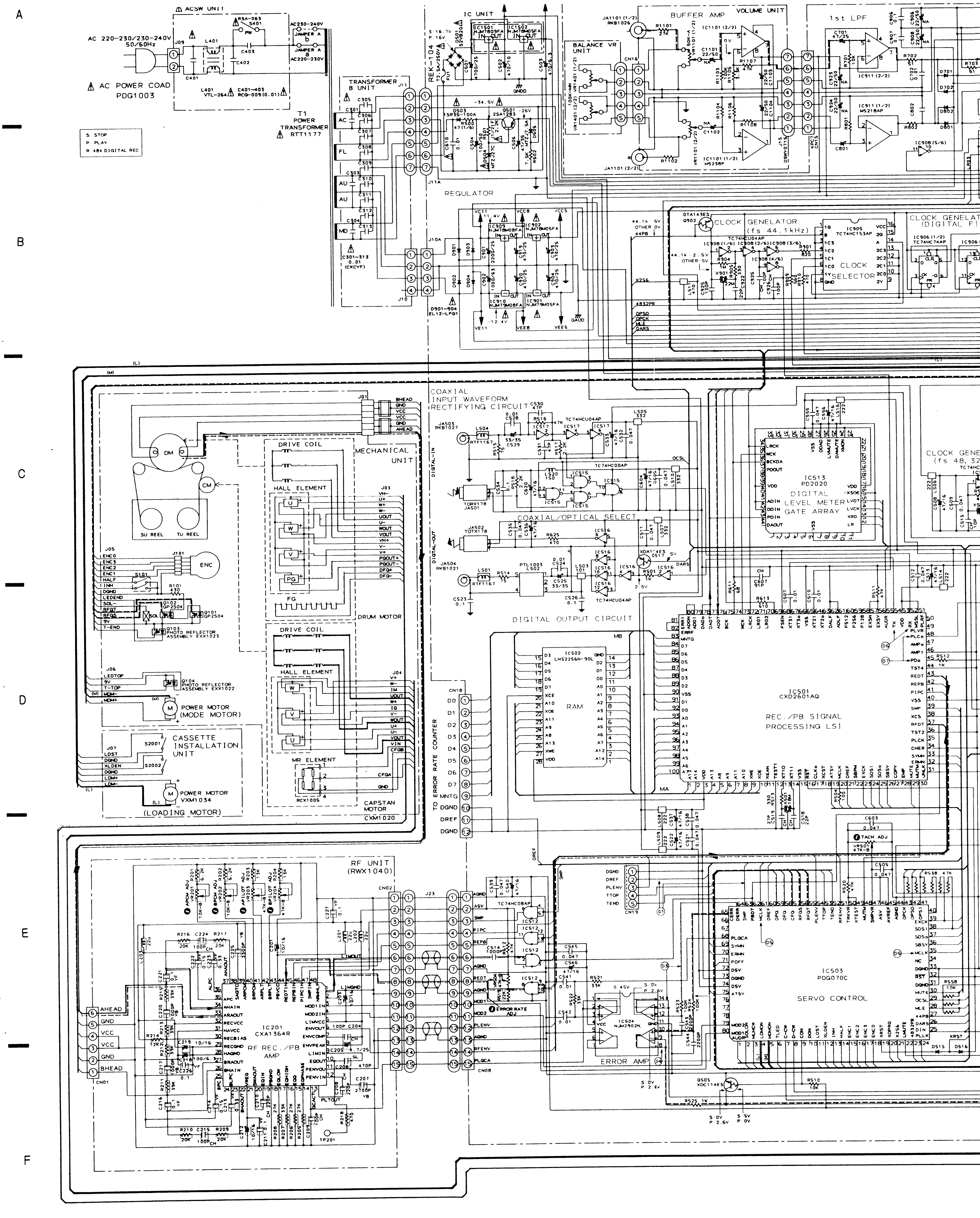
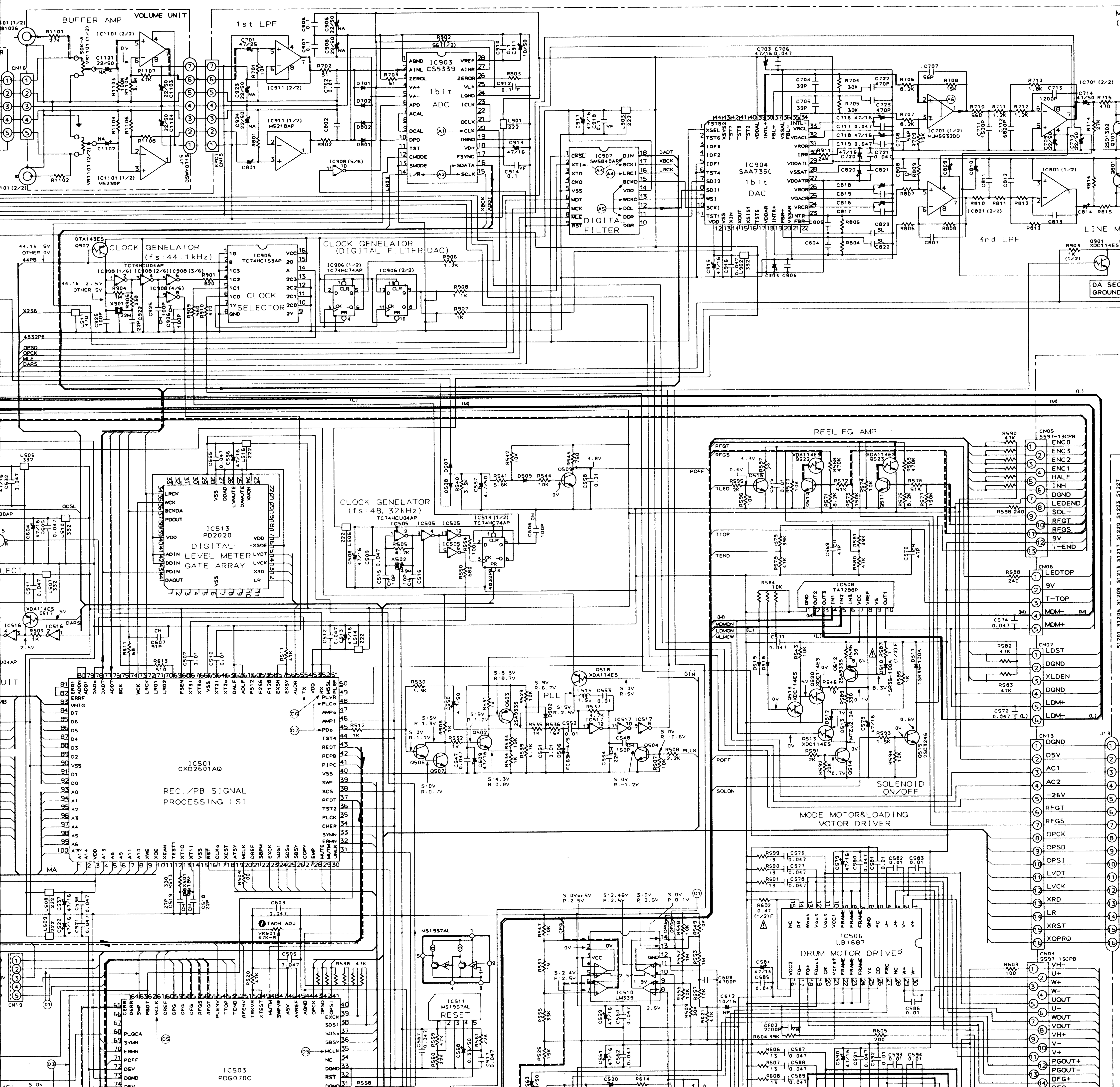


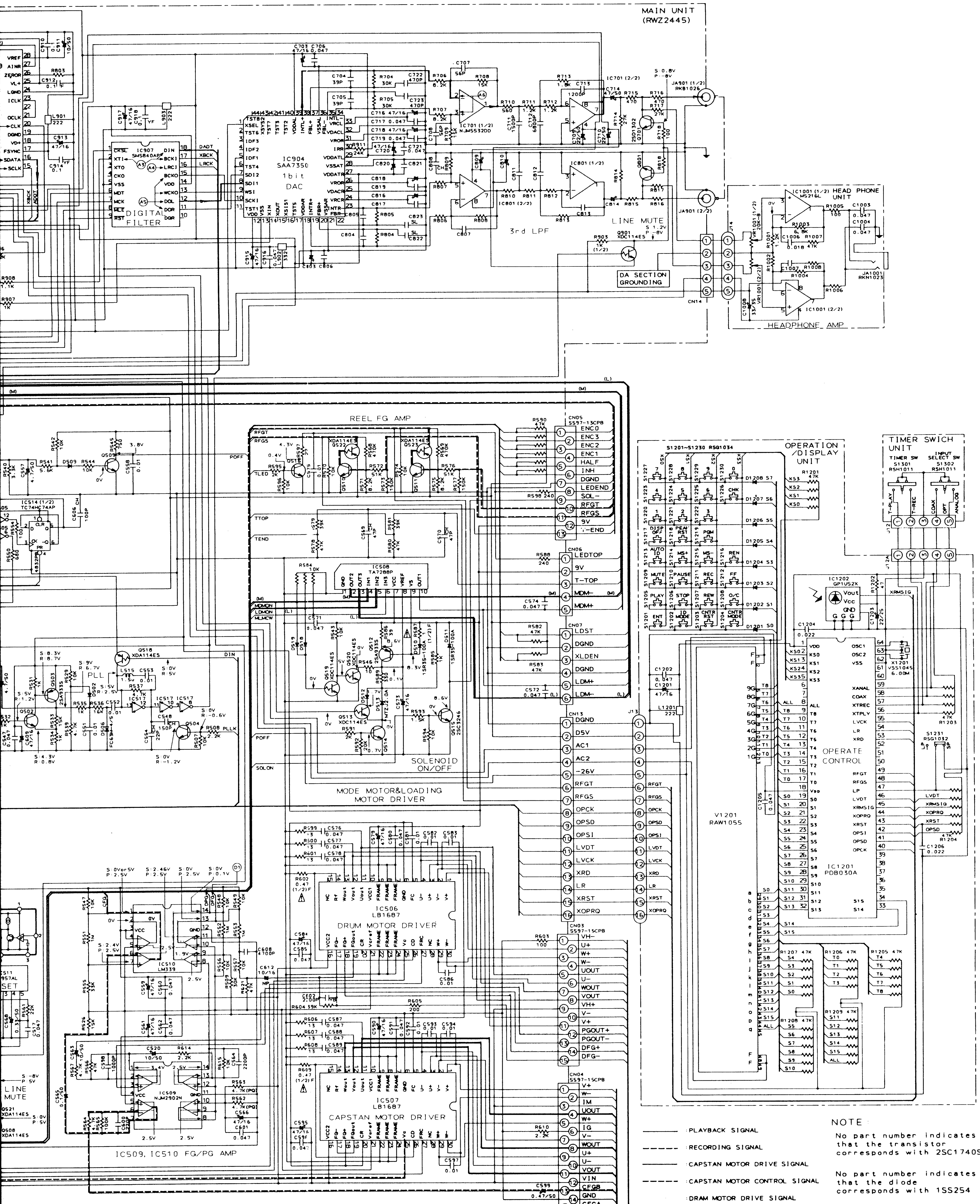
Fig. 3－12

4. SCHEMATIC DIAGRAM AND P.C.BOARDS CONNECTION DIAGRAM


1
2
3
4
A
B
C
D
E
F
ACSW UNIT
AC 220-230/230-240V 50/60Hz
AC POWER COAD PDG1003
RSA-063 S401
PW
AC230-240V
JUMPER A
AC220-230V
L401
C401
C402
C403
L401 VTL-264
C401-403 RCG-009(0.01)
T1 POWER TRANSFORMER RTT1177
S STOP
P PLAY
R 48k DIGITAL REC
TRANSFORMER B UNIT
C301-313 0.01 (CKCYF)
REK-104
IC UNIT
IC1501 NJM7809FA
IC1502 NJM7805FA
REGULATOR
IC909 NJM7808FA
IC902 NJM7805FA
IC910 NJM7908FA
IC901 NJM7905FA
D901-904 EL1Z-LFG1
BUFFER AMP
VOLUME UNIT
BALANCE VR UNIT
JA1101 (1/2) RKB1026
JA1101 (2/2)
IC1101 (1/2) M5238P
1st LPF
IC911 (1/2) M5218AP
CLOCK GENELATOR (fs 44.1kHz)
IC905 TC74HC153AP
CLOCK SELECTOR
CLOCK GENELATOR (DIGITAL FI
COAXIAL INPUT WAVEFORM RECTIFYING CIRCUIT
JA503 RKB1027
DIGITAL-IN
TORX178 JA501
COAXIAL/OPTICAL SELECT
JA502 TOTX178
DIGITAL-OUT
JA504 RKB1021
DIGITAL OUTPUT CIRCUIT
IC513 PD2020
DIGITAL LEVEL METER GATE ARRAY
CLOCK GENE (fs 48, 32
IC502 LH5256N-90L
RAM
IC501 CXD2601AQ
REC./PB SIGNAL PROCESSING LSI
TO ERROR RATE COUNTER
CN18
MECHANICAL UNIT
DRIVE COIL
HALL ELEMENT
FG
DRUM MOTOR
MR ELEMENT
RCX1005
CAPSTAN MOTOR CXM1020
SU REEL
TU REEL
ENC
Q102 GP2504
Q101 GP2504
Q103 PHOTO REFLECTOR ASSEMBLY EXX1023
Q104 PHOTO REFLECTOR ASSEMBLY EXX1022
POWER MOTOR (MODE MOTOR)
CASSETTE INSTALLATION UNIT
POWER MOTOR VXM1034 (LOADING MOTOR)
RF UNIT (RWX1040)
APCM ADJ
BPCM ADJ
APLOT ADJ
BPLOT ADJ
IC201 CXA1364R
RF REC./PB AMP
TP201
CN01
CN02
J23
CN08
CN19
ERROR RATE ADJ
IC504 NJM2902N
ERROR AMP
Q505 XDC114ES
TACH ADJ
IC503 PDG070C
SERVO CONTROL

AGRAM


BUFFER AMP
VOLUME UNIT
1st LPF
IC1101 (2/2)
IC1101 (1/2) M5238P
VR1101 (1/2)
VR1101 (2/2)
IC911 (2/2)
IC911 (1/2) M5218AP
IC903 CS5339
1bit ADC
IC907 SM5840AP
DIGITAL FILTER
IC904 SAA7350
1bit DAC
IC701 (1/2) NJM5532DD
IC801 (1/2)
IC801 (2/2)
3rd LPF
LINE M
Q901 XDC114ES
DA SEC GROUND
CLOCK GENELATOR (fs 44.1kHz)
Q902 DTA143ES
TC74HCU04AP
IC905 TC74HC153AP
CLOCK SELECTOR
CLOCK GENELATOR (DIGITAL FILTER DAC)
IC906 (1/2) TC74HC74AP
IC906 (2/2)
X256
4832PB
OPSD
OPCK
MLE
DARS
IC513 PD2020
DIGITAL LEVEL METER GATE ARRAY
CLOCK GENERATOR (fs 48, 32kHz)
TC74HCU04AP
IC505
IC514 (1/2) TC74HC74AP
X502
REEL FG AMP
Q522 XDA114ES
Q523 XDA114ES
IC508 TA7288P
SOLENOID ON/OFF
MODE MOTOR&LOADING MOTOR DRIVER
CN05 5597-13CPB
ENC0
ENC3
ENC2
ENC1
HALF
INH
DGND
LEDEND
SOL-
RFGT
RFGS
9V
T-END
CN06
LEDTOP
9V
T-TOP
MDM-
MDM+
CN07
LDST
DGND
XLDEN
DGND
LDM+
LDM-
CN13
DGND
D5V
AC1
AC2
-26V
RFGT
RFGS
OPCK
OPSD
OPSI
LVDT
LVCK
XRD
LR
XRST
XOPRQ
CN03 5597-15CPB
VH-
V+
W+
UOUT
U-
WOUT
VOUT
VH+
V-
V+
PGOUT+
PGOUT-
DFG+
DFG-
CN04 5597-15CPB
V+
W-
IM
UOUT
W+
IG
V-
WOUT
U+
U-
VOUT
VIN
CFGB
GND
CFGA
J13
IC501 CXD2601AQ
REC./PB SIGNAL PROCESSING LSI
Q518 XDA114ES
PLL
IC503 PDG070C
SERVO CONTROL
IC511 M51957AL
RESET
M51957AL
TACH ADJ
VR501 47K-B
LINE MUTE
Q521 XDA114ES
Q508 XDA114ES
IC510 LM339
IC509 NJM2902N
IC509, IC510 FG/PG AMP
IC506 LB1687
DRUM MOTOR DRIVER
IC507 LB1687
CAPSTAN MOTOR DRIVER
IC504 NJM2902N
Q505 XDC114ES
IC516
Q517 XDA114ES
CN19
OR AMP


MAIN UNIT
(RWZ2445)
IC907
SM5840AP
DIGITAL FILTER
IC904
SAA7350
1bit
DAC
IC701 (1/2)
NJM5532DD
IC701 (2/2)
IC801 (1/2)
IC801 (2/2)
3rd LPF
LINE MUTE
Q901
XDC114ES
DA SECTION GROUNDING
JA901 (1/2)
RKB1026
JA901 (2/2)
CN14
HEAD PHONE UNIT
IC1001 (1/2)
M5216L
IC1001 (2/2)
JA1001
RKN1023
HEADPHONE AMP
REEL FG AMP
IC508
TA7288P
SOLENOID ON/OFF
MODE MOTOR&LOADING MOTOR DRIVER
PLL
IC514 (1/2)
TC74HC74AP
IC506
LB1687
DRUM MOTOR DRIVER
IC507
LB1687
CAPSTAN MOTOR DRIVER
IC510
LM339
IC509
NJM2902N
IC509, IC510 FG/PG AMP
LINE MUTE
CN05
5597-13CPB
CN06
CN07
CN13
CN03
5597-15CPB
CN04
5597-15CPB
J13
OPERATION /DISPLAY UNIT
S1201~S1230 RSG1034
V1201
RAW1055
IC1201
PD8030A
OPERATE CONTROL
IC1202
GP1U52X
X1201
VSS1045
6.00M
TIMER SWICH UNIT
TIMER SW
S1301
RSH1011
INPUT SELECT SW
S1302
RSH1011
T-PLAY
T-REC
COAX
OPT
ANALOG
J12
J124
S1231
RSG1032

——— :PLAYBACK SIGNAL

- - - - - :RECORDING SIGNAL

——— :CAPSTAN MOTOR DRIVE SIGNAL

- - - - - :CAPSTAN MOTOR CONTROL SIGNAL

:DRAM MOTOR DRIVE SIGNAL

:DRAM MOTOR CONTROL SIGNAL

—(L)— :LOADING MOTOR DRIVE SIGNAL

—(M)— :MODE MOTOR DRIVE SIGNAL

- - - - - :REEL CONTROL SIGNAL

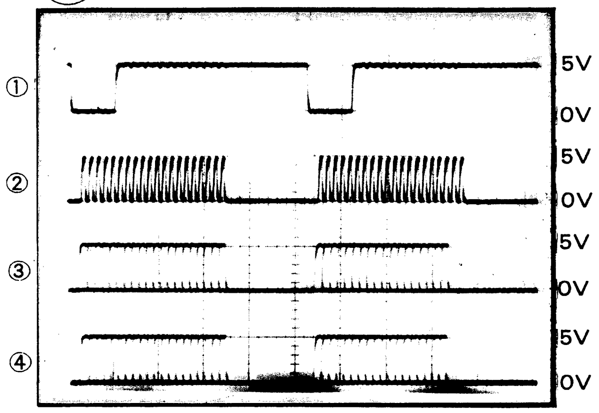
▭ :CHIP PART

NOTE :

No part number indicates that the transistor corresponds with 2SC1740S

No part number indicates that the diode corresponds with 1SS254

A5

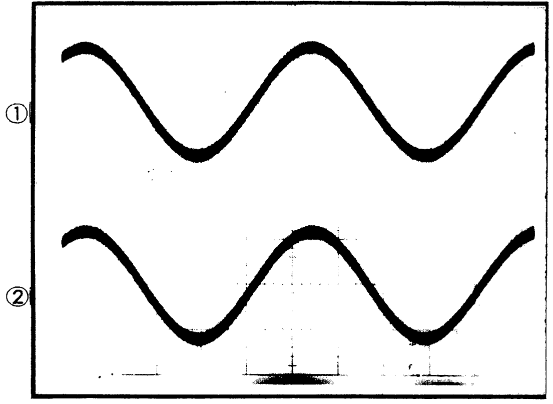


A5: CLOCK/DATA output of DF (DAC input)

500nS/div, 5V/div
① WCKO (IC907−Pin13)
② BCKO (IC907−Pin15)
③ DOL (IC907−Pin12)
④ DOR (IC907−Pin11)

Mode : 1kHz, 0dB (PLAY or REC)

A6



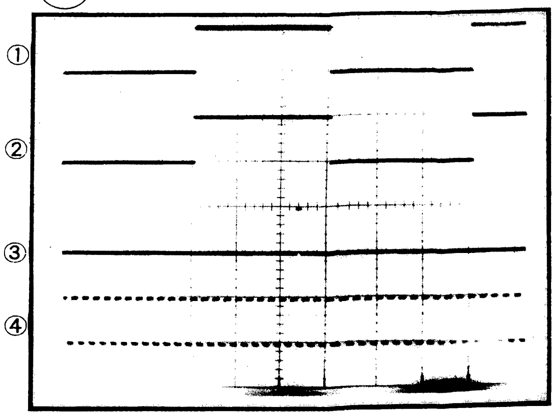
A6: Analog waveform of around LPF

200μS/div, 0.5V/div
① IC701−Pin2
② IC701−Pin3

Mode : 1kHz, 0dB (PLAY or REC)

< Digital Section >

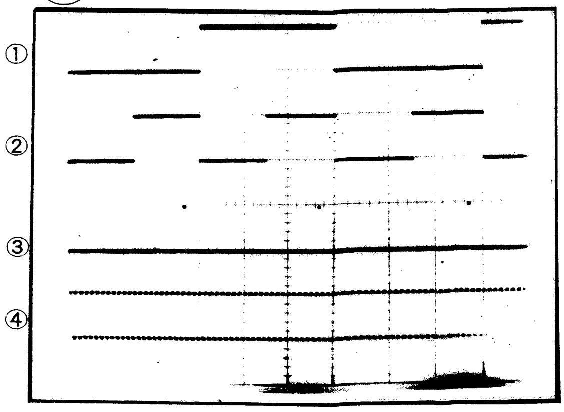
D1



D1: SP mode PLAY 5V/div, 5mS/div

① DREF (CN19−Pin2)
② SWP (IC503−Pin63) H : Bch, L : Ach
③ SDP (IC510−Pin14)
④ DFG (IC510−Pin13)

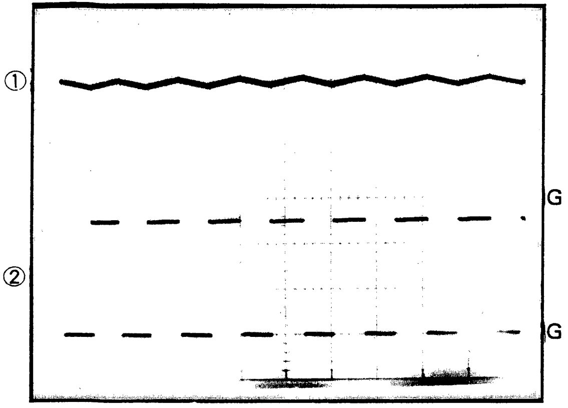
D2



D2: LP mode PLAY 5V/div, 10mS/div

① DREF (CN19−Pin2)
② SWP (IC503−Pin63) H : Bch, L : Ach
③ SDP (IC510−Pin14)
④ DFG (IC510−Pin13)

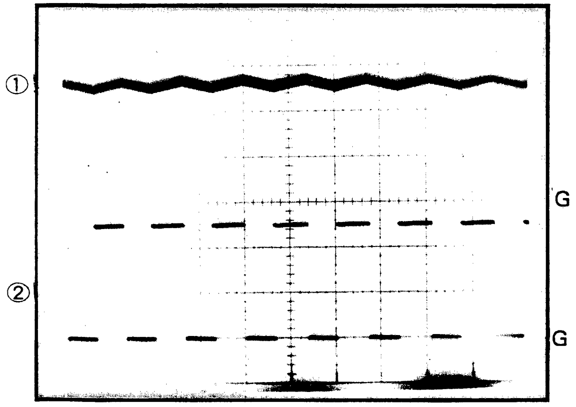
D3



D3: PLAY 20μS/div

① D−Vo (IC504−Pin14) 1V/div
② DERR (IC503−Pin64) 2V/div

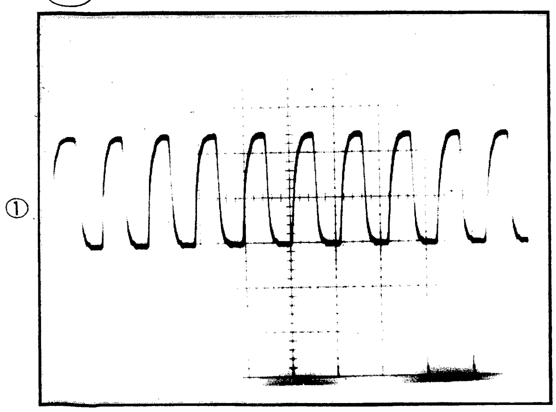
D4



D4: PLAY 20μS/div

① C−Vo (IC504−Pin8) 1V/div
② CERR (IC503−Pin65) 2V/div

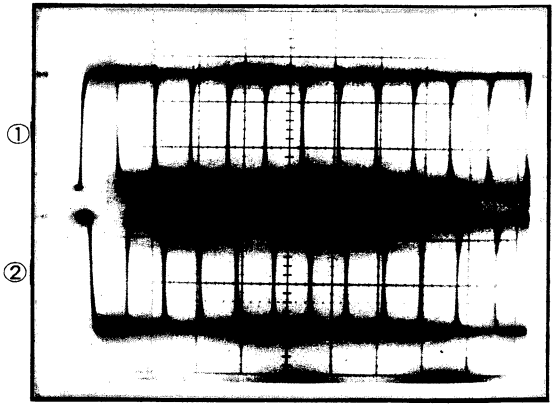
D5



D5

① MCLK (IC503−Pins35, 61) 0.1μS/div, 2V/div

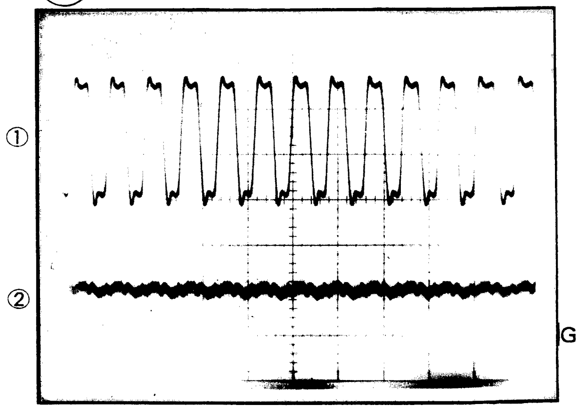
D6



D6: Digital REC (fs : 48k) 0.2μS/div, 2V/div

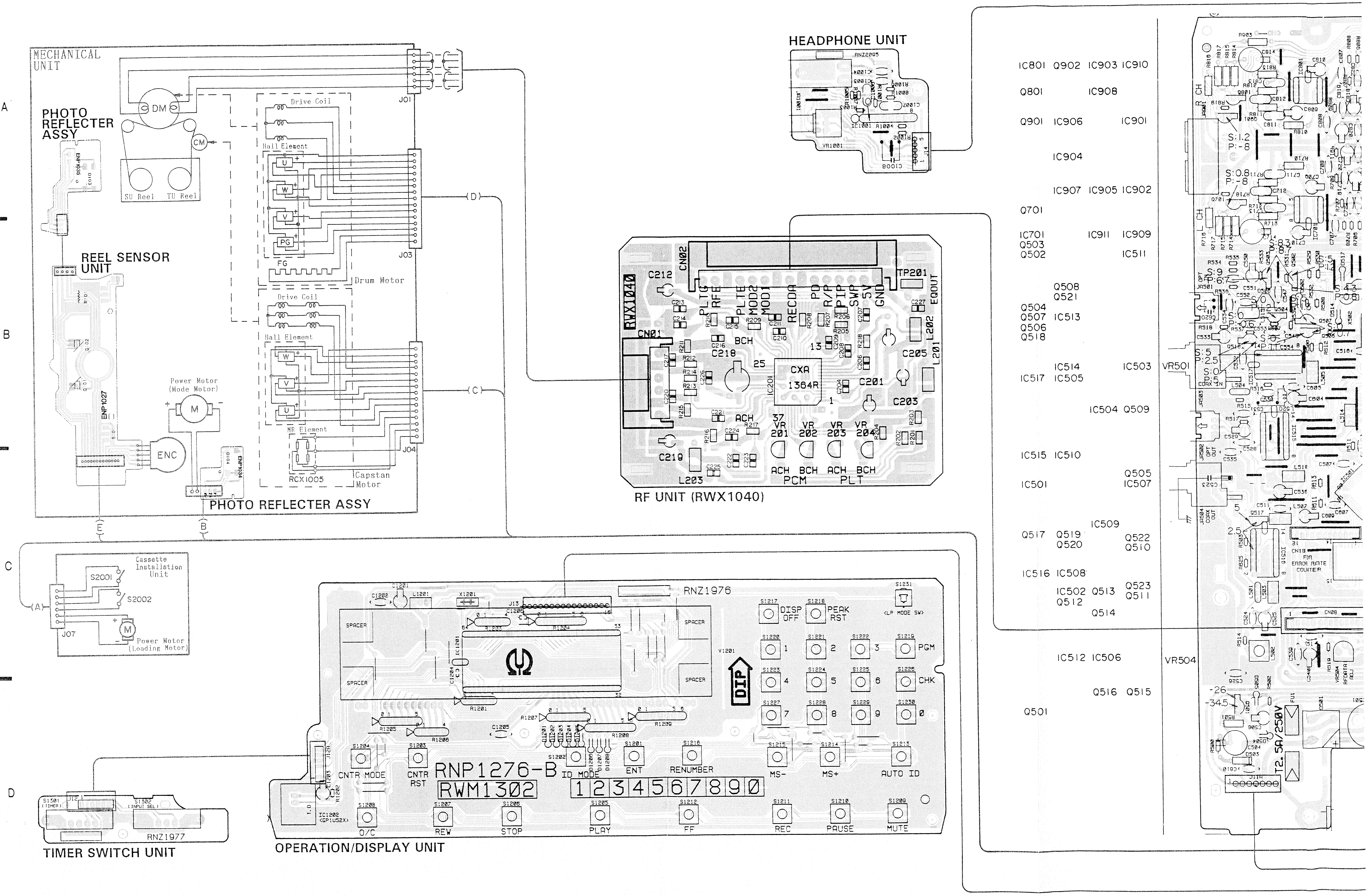
① RX (IC515−Pin8)
② TX (IC501−Pin54)

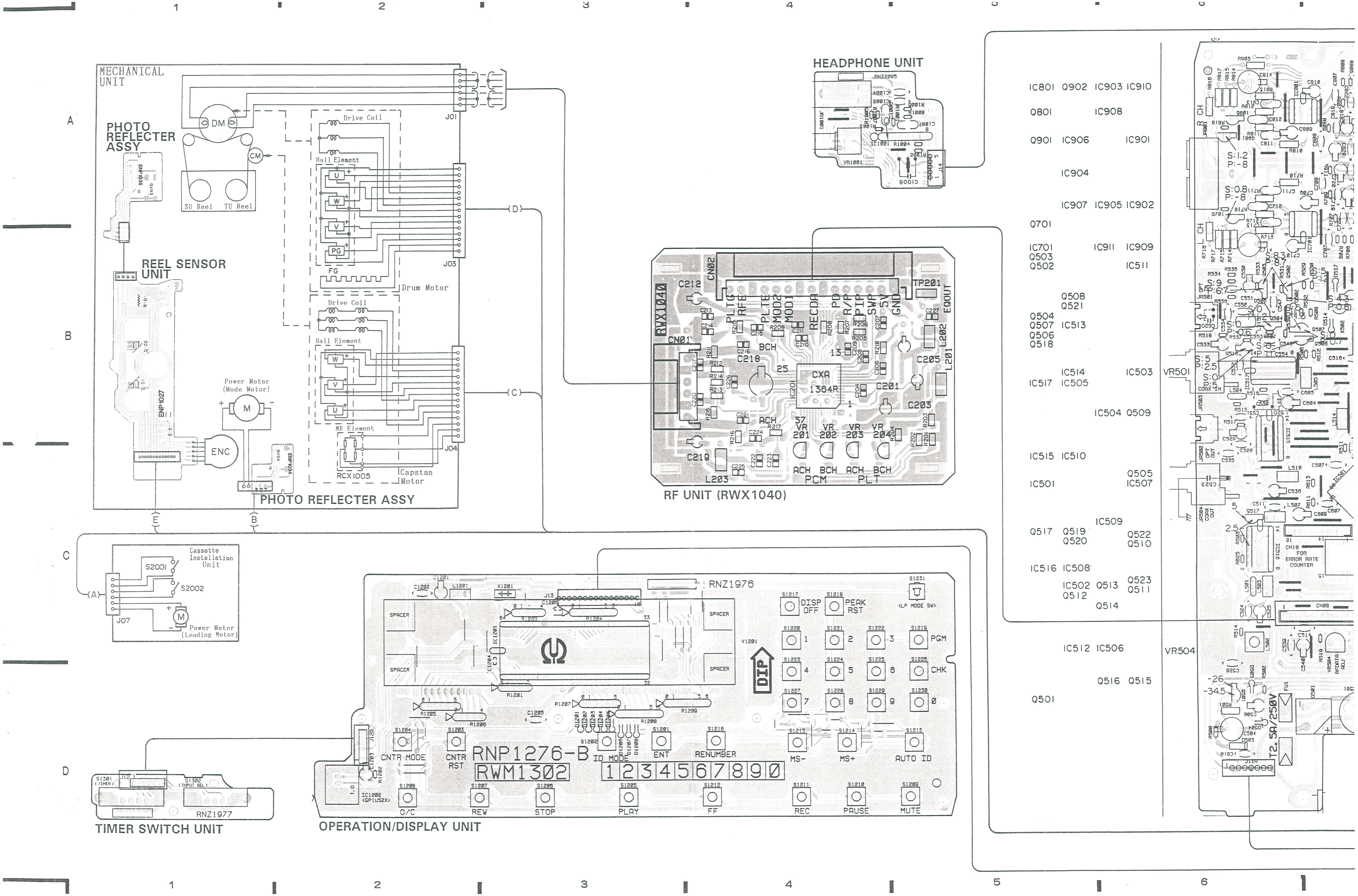
D7

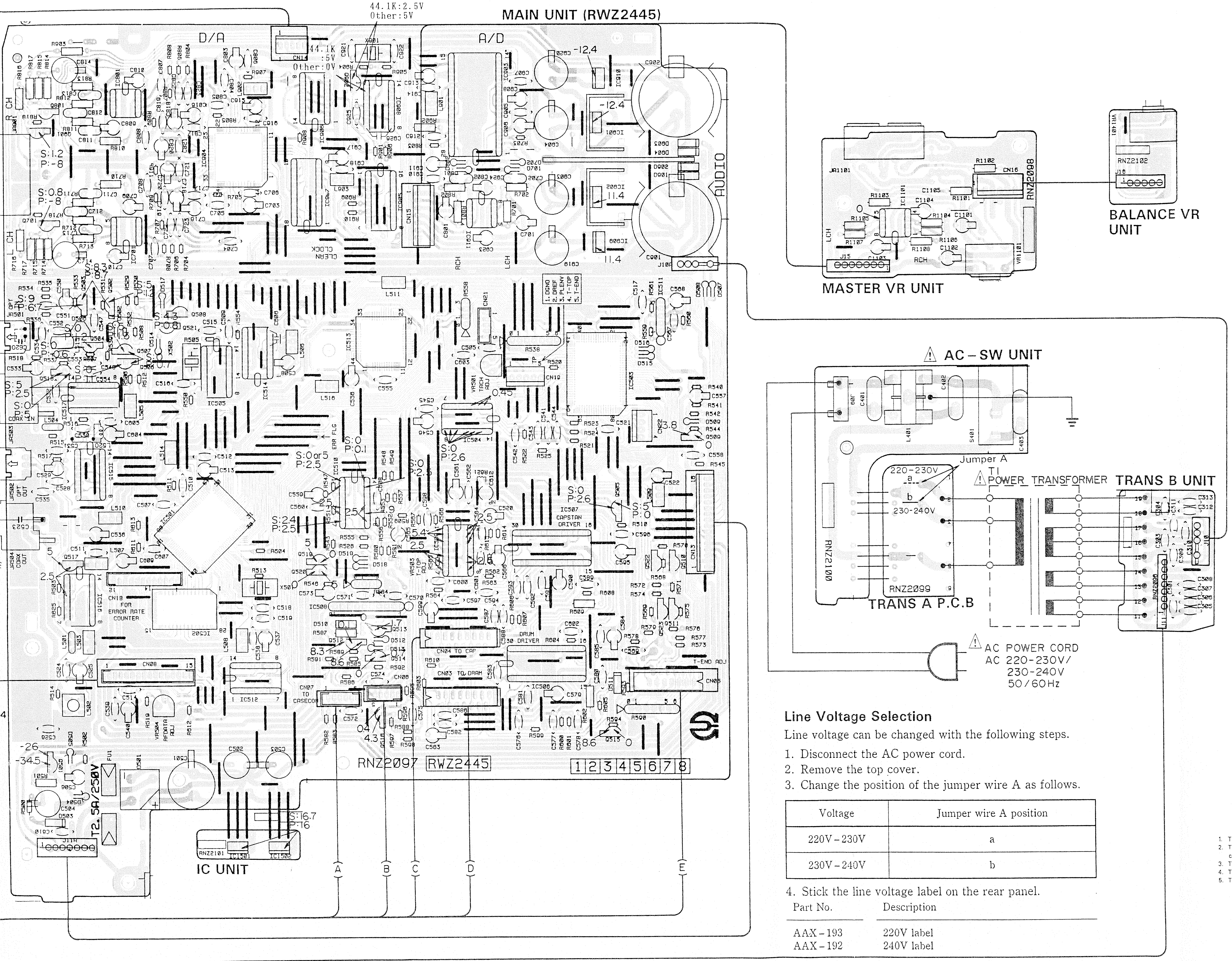


D7: Digital REC (fs : 48k) 50nS/div

① PLCo (IC517−Pin8) 2V/div
② PDo (IC501−Pin45) 1V/div


MECHANICAL UNIT
PHOTO REFLECTER ASSY
REEL SENSOR UNIT
ENP1027
DM
CM
SU Reel
TU Reel
Drive Coil
Hall Element
PG
FG
Drum Motor
Power Motor (Mode Motor)
ENC
MR Element
RCX1005
Capstan Motor
PHOTO REFLECTER ASSY
ENP1034
J01
J03
J04
Cassette Installation Unit
S2001
S2002
Power Motor (Loading Motor)
J07
TIMER SWITCH UNIT
S1301 (TIMER)
S1302 (INPUT SEL)
RNZ1977
OPERATION/DISPLAY UNIT
RNP1276-B
RWM1302
RNZ1976
V1201
DISP OFF
PEAK RST
(LP MODE SW)
PGM
CHK
CNTR MODE
CNTR RST
ID MODE
ENT
RENUMBER
MS-
MS+
AUTO ID
O/C
REW
STOP
PLAY
FF
REC
PAUSE
MUTE
IC1202 (GP1U52X)
HEADPHONE UNIT
RNZ2095
VR1001
J14
RF UNIT (RWX1040)
RWX1040
CN01
CN02
CXA 1364R
PLTC RFE PLTE MOD2 MOD1 RECDA PD R/P PIP SWP 5V GND
EQOUT
TP201
BCH
ACH
VR 201 VR 202 VR 203 VR 204
ACH BCH ACH BCH
PCM PLT
IC801 Q902 IC903 IC910
Q801 IC908
Q901 IC906 IC901
IC904
IC907 IC905 IC902
Q701
IC701 IC911 IC909
Q503 IC511
Q502
Q508
Q521
Q504
Q507 IC513
Q506
Q518
IC514 IC503
IC517 IC505
IC504 Q509
IC515 IC510
Q505
IC501 IC507
IC509
Q517 Q519 Q522
Q520 Q510
IC516 IC508
IC502 Q513 Q523
Q512 Q511
Q514
IC512 IC506
Q516 Q515
Q501
VR501
VR504
R CH
L CH
S:1.2 P:-8
S:0.8 P:-8
CN18
FOR ERROR RATE COUNTER
T2.5A/250V
-26
-34.5
1 2 3 4 5 6
A B C D


MECHANICAL UNIT
PHOTO REFLECTER ASSY
DM
CM
SU Reel
TU Reel
Drive Coil
Hall Element
U
W
V
PG
FG
Drum Motor
J01
J03
J04
REEL SENSOR UNIT
ENP1027
Power Motor (Mode Motor)
M
ENC
MR Element
RCX1005
Capstan Motor
PHOTO REFLECTER ASSY
E
B
D
C
A
Cassette Installation Unit
S2001
S2002
J07
Power Motor (Loading Motor)
HEADPHONE UNIT
RNZ2005
J14
VR1001
RF UNIT (RWX1040)
RWX1040
CN01
CN02
C212
TP201
PLTG
RFE
PLTE
MOD2
MOD1
RECDA
PD
R/P
PIP
SWP
5V
GND
EQOUT
BCH
C218
25
13
CXA 1364R
IC201
C201
C205
C203
L202
L201
ACH
37
VR 201
VR 202
VR 203
VR 204
C219
L203
ACH BCH ACH BCH
PCM PLT
IC801 Q902 IC903 IC910
Q801 IC908
Q901 IC906 IC901
IC904
IC907 IC905 IC902
Q701
IC701 IC911 IC909
Q503 IC511
Q502
Q508
Q521
Q504
Q507 IC513
Q506
Q518
IC514 IC503
IC517 IC505
IC504 Q509
IC515 IC510
IC501 Q505
IC507
IC509
Q517 Q519 Q522
Q520 Q510
IC516 IC508
IC502 Q513 Q523
Q512 Q511
Q514
IC512 IC506
Q516 Q515
Q501
VR501
VR504
R CH
L CH
S:1.2
P:-8
S:0.8
P:-8
CN19 FOR ERROR RATE COUNTER
CN08
T2.5A/250V
RNZ1976
S1231 <LP MODE SW>
DISP OFF
PEAK RST
1 2 3 PGM
4 5 6 CHK
7 8 9 0
J13
V1201
DIP
SPACER
IC1201
R1201
CNTR MODE
CNTR RST
RNP1276-B
RWM1302
ID MODE
ENT
RENUMBER
MS-
MS+
AUTO ID
1234567890
J121
IC1202 <GP1U52X>
O/C
REW
STOP
PLAY
FF
REC
PAUSE
MUTE
OPERATION/DISPLAY UNIT
S1301 (TIMER)
S1302 (INPUT SEL)
J12
RNZ1977
TIMER SWITCH UNIT
1 2 3 4 5 6
A B C D


44.1K:2.5V
Other:5V
MAIN UNIT (RWZ2445)
D/A
A/D
44.1K :5V
Other:0V
-12.4
-12.4
11.4
11.4
AUDIO
R CH
L CH
S:1.2
P:-8
S:0.8
P:-8
S:9
P:6.7
S:5
P:2.5
S:0
P:2.5
S:0or5
P:2.5
S:0
P:0.1
S:0
P:2.6
S:0
P:2.6
S:0
P:0
S:2.4
P:2.5
CLEAN CLOCK
ERR FLG
IC507 CAPSTAN DRIVER
DRUM DRIVER
CN18 FOR ERROR RATE COUNTER
CN04 TO CAP
CN03 TO DRAM
CN07 TO CASECON
T-END ADJ
RFDATA ADJ
-26
-34.5
T2.5A/250V
S:16.7
P:16
IC UNIT
RNZ2097
RWZ2445
1 2 3 4 5 6 7 8
A
B
C
D
E
MASTER VR UNIT
BALANCE VR UNIT
RNZ2098
RNZ2102
AC-SW UNIT
Jumper A
220-230V
a
b
230-240V
T1
POWER TRANSFORMER
TRANS B UNIT
RNZ2100
RNZ2099
TRANS A P.C.B
AC POWER CORD
AC 220-230V/
230-240V
50/60Hz

Line Voltage Selection

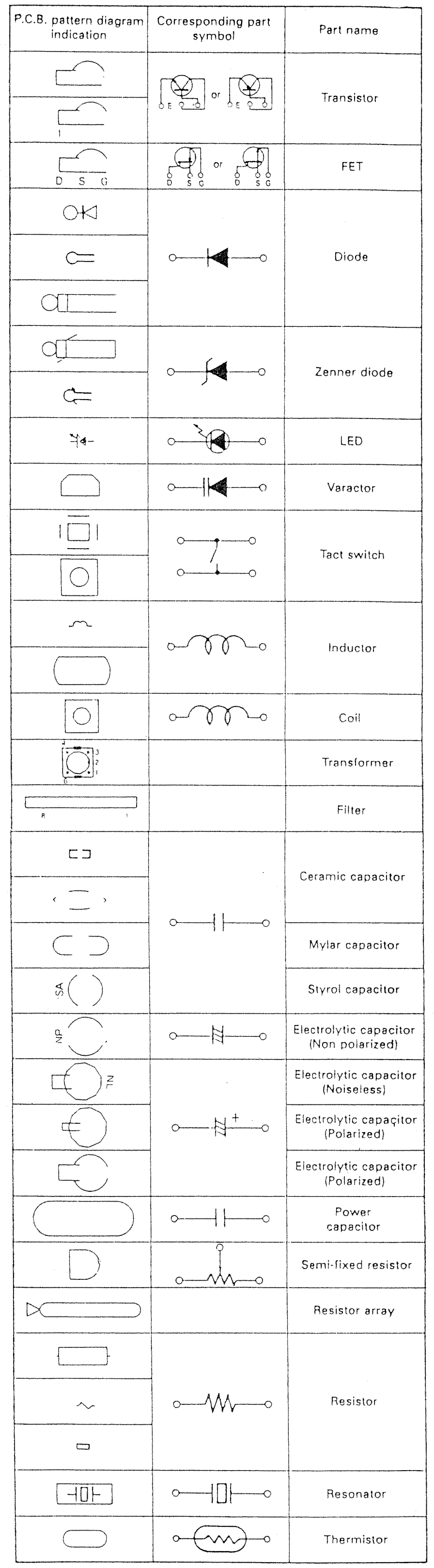
Line voltage can be changed with the following steps.

1. Disconnect the AC power cord.
2. Remove the top cover.
3. Change the position of the jumper wire A as follows.

Voltage	Jumper wire A position
220V－230V	a
230V－240V	b

4. Stick the line voltage label on the rear panel.

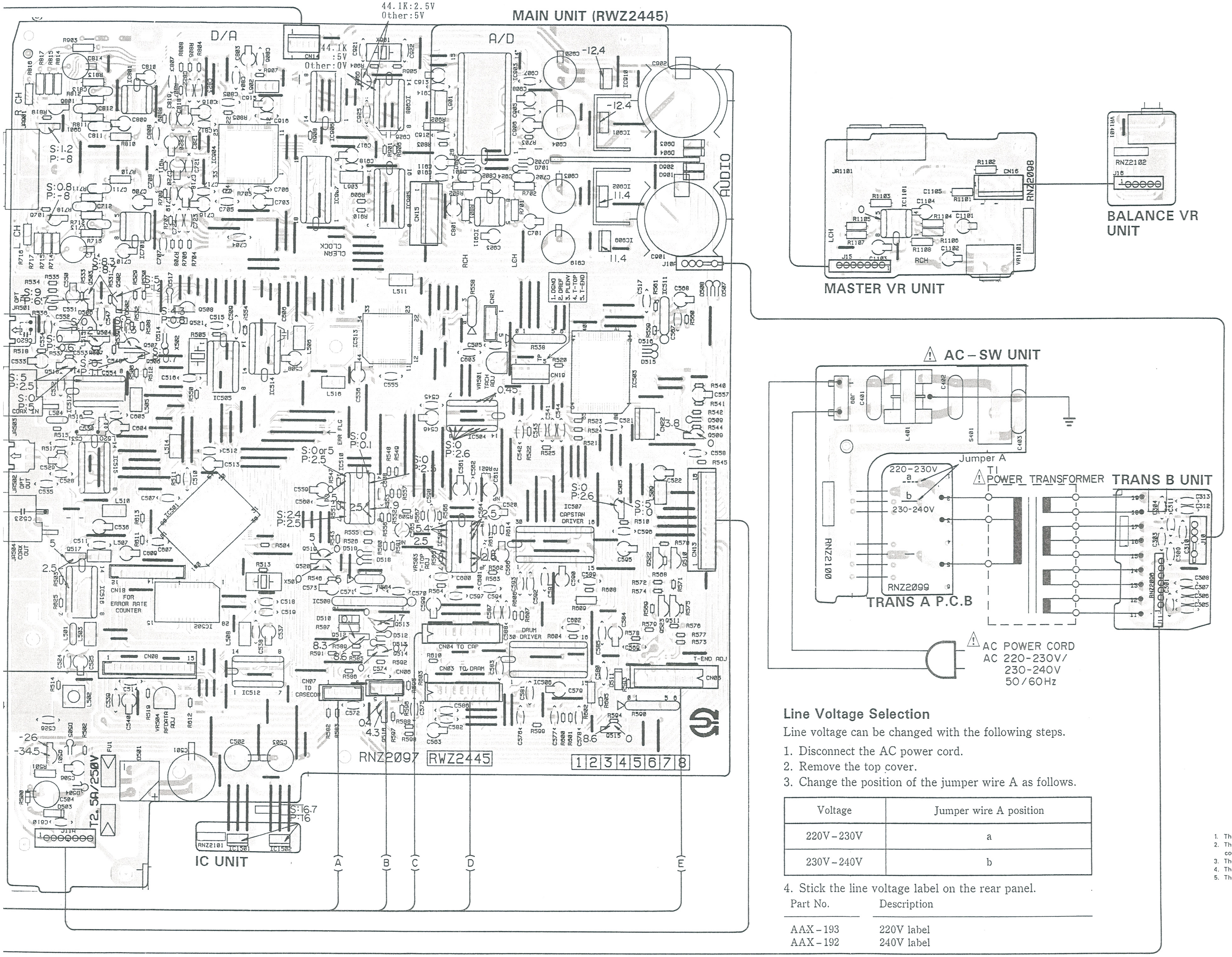
Part No.	Description
AAX－193	220V label
AAX－192	240V label



P.C.B. pattern diagram indication	Corresponding part symbol	Part name
		Transistor
		FET
		Diode
		Zenner diode
		LED
		Varactor
		Tact switch
		Inductor
		Coil
		Transformer
		Filter
		Ceramic capacitor
		Mylar capacitor
		Styrol capacitor
		Electrolytic capacitor (Non polarized)
		Electrolytic capacitor (Noiseless)
		Electrolytic capacitor (Polarized)
		Electrolytic capacitor (Polarized)
		Power capacitor
		Semi-fixed resistor
		Resistor array
		Resistor
		Resonator
		Thermistor

E
D S G
or
SA
NP
NL
+

1. This P.C.B. connection diagram is viewed from the parts mounted side.
2. The parts which have been mounted on the board can be replaced with those shown with the corresponding wiring symbols listed in the above Table.
3. The capacitor terminal marked with ▭ shows negative terminal.
4. The diode marked with ○ shows cathode side.
5. The transistor terminal marked with ▭ shows emitter.


MAIN UNIT (RWZ2445)
D/A
A/D
44.1K:2.5V
Other:5V
AUDIO
CLEAN CLOCK
R CH
L CH
OPT OUT
COAX OUT
COAX IN
OPT IN
FOR ERROR RATE COUNTER
CAPSTAN DRIVER
DRUM DRIVER
CN04 TO CAP
CN03 TO DRUM
CN07 TO CASECON
T-END ADJ
T-TOP ADJ
TACH ADJ
AFDATA ADJ
ERR FLG
1.DGND 2.DREF 3.PLAYV 4.T-TOP 5.T-END
T2.5A/250V
RNZ2097 RWZ2445
1 2 3 4 5 6 7 8
IC UNIT
RNZ2101
MASTER VR UNIT
RNZ2098
BALANCE VR UNIT
RNZ2102
AC – SW UNIT
RNZ2100
Jumper A
220-230V
230-240V
POWER TRANSFORMER
T1
TRANS A P.C.B
RNZ2099
TRANS B UNIT
AC POWER CORD
AC 220-230V/
230-240V
50/60Hz
A
B
C
D
E

Line Voltage Selection

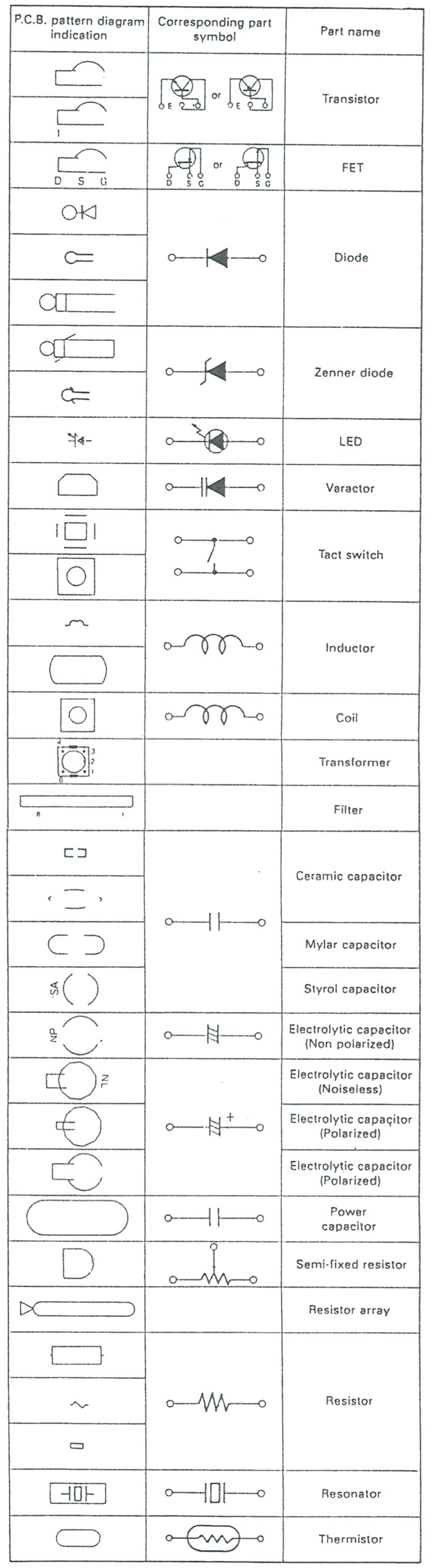
Line voltage can be changed with the following steps.

1. Disconnect the AC power cord.
2. Remove the top cover.
3. Change the position of the jumper wire A as follows.

Voltage	Jumper wire A position
220V – 230V	a
230V – 240V	b

4. Stick the line voltage label on the rear panel.

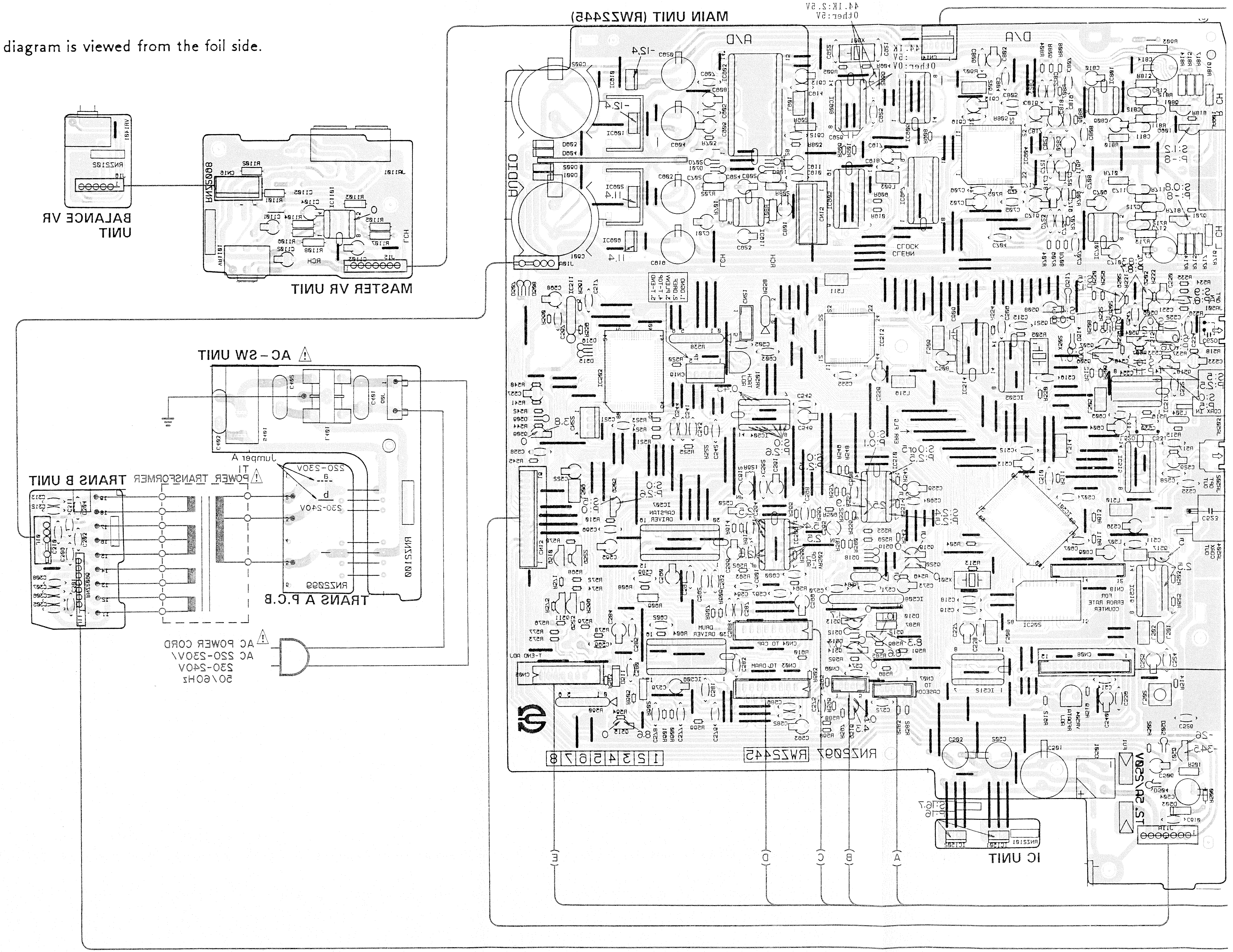
Part No.	Description
AAX – 193	220V label
AAX – 192	240V label



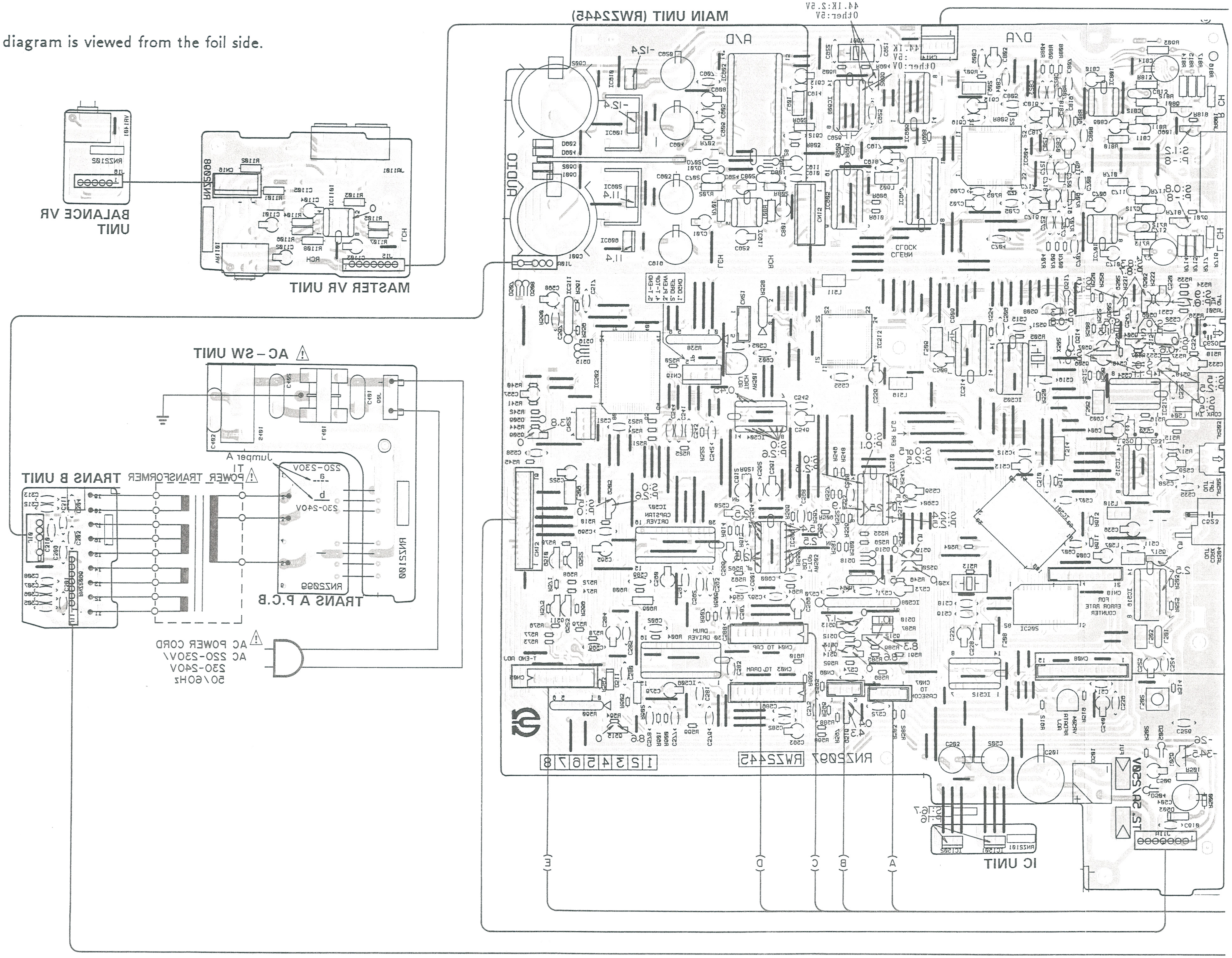
P.C.B. pattern diagram indication	Corresponding part symbol	Part name
		Transistor
		FET
		Diode
		Zenner diode
		LED
		Varactor
		Tact switch
		Inductor
		Coil
		Transformer
		Filter
		Ceramic capacitor
		Mylar capacitor
		Styrol capacitor
		Electrolytic capacitor (Non polarized)
		Electrolytic capacitor (Noiseless)
		Electrolytic capaçitor (Polarized)
		Electrolytic capacitor (Polarized)
		Power capacitor
		Semi-fixed resistor
		Resistor array
		Resistor
		Resonator
		Thermistor

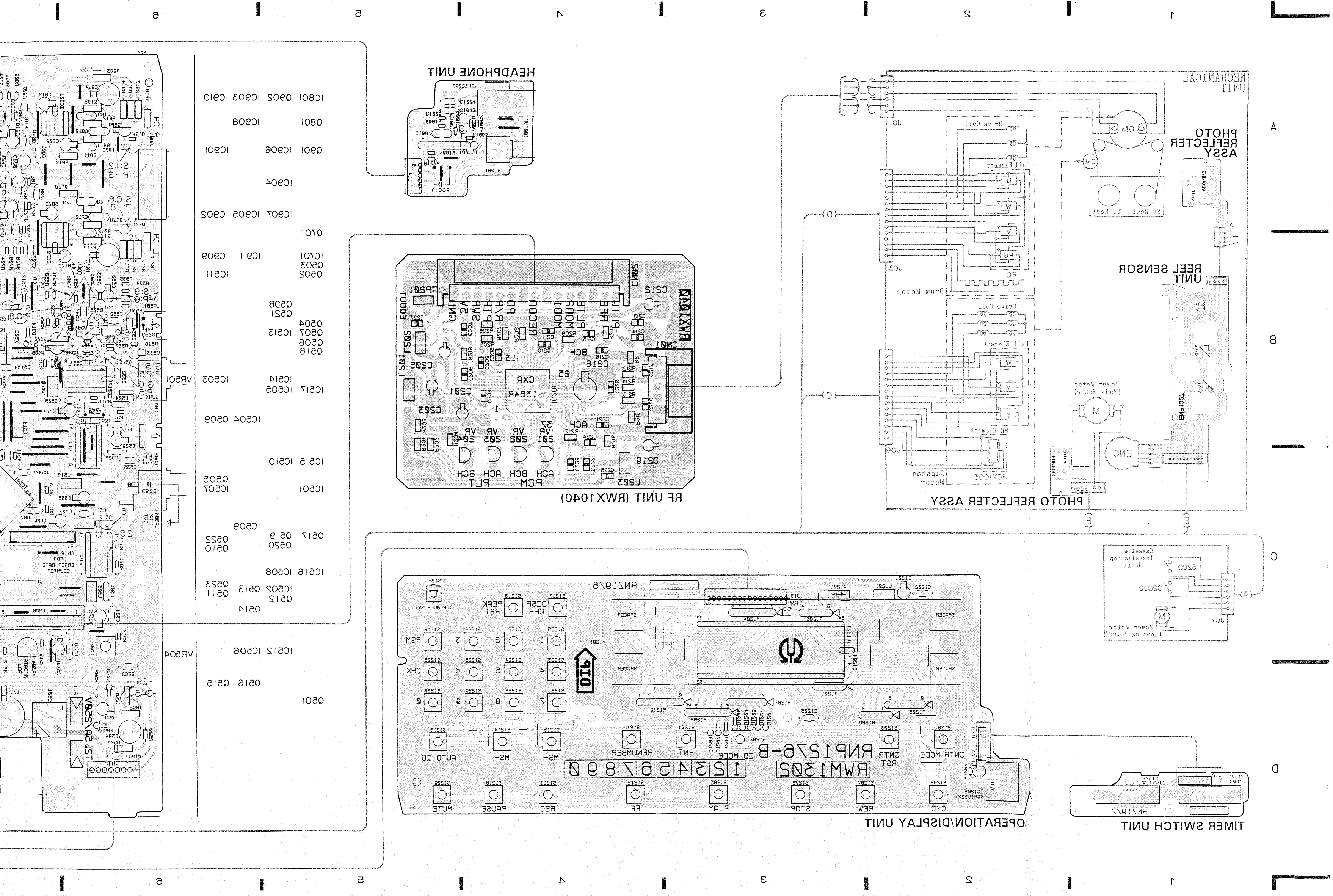
1. This P.C.B. connection diagram is viewed from the parts mounted side.
2. The parts which have been mounted on the board can be replaced with those shown with the corresponding wiring symbols listed in the above Table.
3. The capacitor terminal marked with ▭ shows negative terminal.
4. The diode marked with ○ shows cathode side.
5. The transistor terminal marked with ▭ shows emitter.

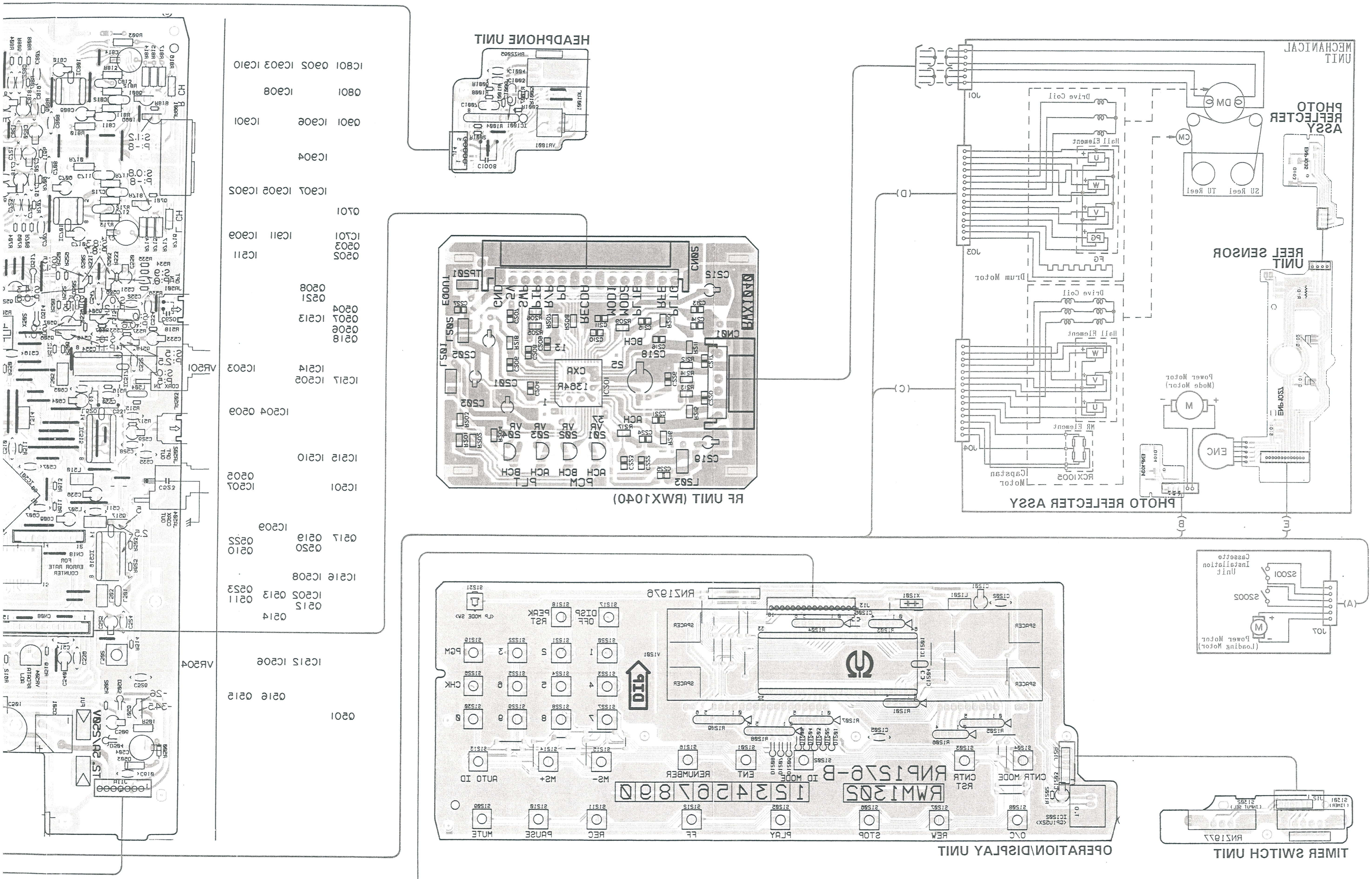
This P.C.B. connection diagram is viewed from the foil side.


MAIN UNIT (RWZ2445)
A/D
D/A
AUDIO
BALANCE VR UNIT
MASTER VR UNIT
AC-SW UNIT
TRANS B UNIT
POWER TRANSFORMER
T1
Jumper A
220-230V
230-240V
TRANS A P.C.B
RNZ2099
RNZ2100
AC POWER CORD
AC 220-230V/
AC 230-240V
50/60Hz
CAPSTAN DRIVER
DRUM DRIVER
FOR ERROR RATE COUNTER
CLOCK
IC UNIT
RNZ2097
RWZ2445
1 2 3 4 5 6 7 8
A
B
C
D
E

This P.C.B. connection diagram is viewed from the foil side.


MAIN UNIT (RWZ2445)
A/D
D/A
AUDIO
BALANCE VR UNIT
MASTER VR UNIT
AC - SW UNIT
TRANS B UNIT
POWER TRANSFORMER
T1
Jumper A
220-230V
230-240V
TRANS A P.C.B
AC POWER CORD
AC 220-230V/
230-240V
50/60Hz
IC UNIT
RNZ2007 RWZ2445
CLOCK CLEAN
CAPSTAN DRIVER
DRUM DRIVER
FOR ERROR RATE COUNTER
LCH
RCH
A
B
C
D
E


HEADPHONE UNIT
RF UNIT (RWX1040)
MECHANICAL UNIT
PHOTO REFLECTER ASSY
REEL SENSOR UNIT
OPERATION/DISPLAY UNIT
TIMER SWITCH UNIT
RNP1276-B
RWM1302
CXA 1364R
Drum Motor
Capstan Motor
Power Motor (Mode Motor)
Power Motor (Loading Motor)
Cassette Installation Unit
SU Reel
TU Reel
PLAY
STOP
REW
FF
REC
PAUSE
MUTE
AUTO ID
RENUMBER
ENT
ID MODE
CNTR MODE
CNTR RST
DISP OFF
PEAK RST
PGM
CHK
1
2
3
4
5
6
7
8
9
0
A
B
C
D
1
2
3
4
5
6


HEADPHONE UNIT
RF UNIT (RWX1040)
MECHANICAL UNIT
PHOTO REFLECTER ASSY
REEL SENSOR UNIT
PHOTO REFLECTER ASSY
OPERATION/DISPLAY UNIT
TIMER SWITCH UNIT
RNP1276-B
RWM1302
CXA1364R
Drum Motor
Capstan Motor
Drive Coil
Hall Element
MR Element
RCX1005
Power Motor (Mode Motor)
Power Motor (Loading Motor)
Cassette Installation Unit
S2001
S2002
SU Reel
TU Reel
DM
CM
ENC
J01
J03
J04
J07
(A)
(B)
(C)
(D)
(E)
IC801 Q902 IC903 IC910
Q801 IC908
Q901 IC906 IC901
IC904
IC907 IC905 IC902
Q701
IC701 IC911 IC909
Q503 IC511
Q502
Q508
Q521
Q504
Q507 IC513
Q506
Q518
IC514 IC503
IC517 IC505
IC504 Q509
IC515 IC510
Q505
IC501 IC507
IC509
Q517 Q519 Q522
Q520 Q510
IC516 IC508
Q523
IC502 Q513 Q511
Q512
Q514
IC512 IC506
Q516 Q515
Q501
VR501
VR504
AUTO ID
MS+
MS−
RENUMBER
ENT
ID MODE
CNTR RST
CNTR MODE
MUTE
PAUSE
REC
FF
PLAY
STOP
REW
O/C
PGM
CHK
DISP OFF
PEAK RST
A
B
C
D
1
2
3
4
5
6

5. PCB's PARTS LIST

NOTES:

- *Part without part number cannot be supplied.*
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*

Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).

560Ω 56 × 10¹ 561........................RD1/8PM 5 6 1 J
47kΩ 47 × 10³ 473........................RD1/4PS 4 7 3 J
0.5Ω 0R5...RN2H 0 R 5 K
1Ω 010...RS1P 0 1 0 K

Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62kΩ 562 × 10¹ 5621......................RN1/4SR 5 6 2 1 F

◉ RF UNIT (RWX1040)

Mark	No.	Description	Parts No.
	SEMICONDUCTORS		
	IC201	RF IC	CXA1364R
	COILS		
	L201-203	COIL	RTF1173
	CAPACITORS		
	C201, 203	CHIP CAPACITOR 10UF	RCH1052
	C204	CHIP CAPACITOR	CCSQCH101J50
	C205	CHIP CAPACITOR 4.7UF	RCH1053
	C206	CHIP CAPACITOR	CCSQSL471J50
	C207	CERAMIC CAPACITOR	CKSQYB272K50
	C208	CHIP CERAMIC C.	CCSQCH221J50
	C209	CHIP CAPACITOR	CCSQCH101J50
	C210	CHIP CERAMIC C.	CCSQCH221J50
	C211	CERAMIC CAPACITOR	CKSQYF104Z25
	C212	CHIP CAPACITOR 10UF	RCH1052
	C213	CERAMIC CAPACITOR	CKSYF334Z25
	C214	CHIP CAPACITOR	CKSYF154Z25
	C215	CHIP CAPACITOR	CCSQCH101J50
	C216	CERAMIC CAPACITOR	CKSQYF104Z25
	C217	CHIP CAPACITOR	CKSQYB102K50
	C218	CHIP CAPACITOR 100UF	RCH1054
	C219	CHIP CAPACITOR 10UF	RCH1052
	C220	CHIP CAPACITOR	CKSQYB102K50
	C221	CERAMIC CAPACITOR	CKSQYF104Z25
	C222	CHIP CAPACITOR	CKSYF154Z25
	C223	CERAMIC CAPACITOR	CKSYF334Z25
	C224	CHIP CAPACITOR	CCSQCH101J50
	C225	CERAMIC CAPACITOR	CKSQYB332K50
	C226, 227	CERAMIC CAPACITOR	CKSQYF104Z25
	RESISTORS		
	VR201, 202	CHIP VR 10K	RCP1085
	VR203, 204	CHIP VR 47K	RCP1086
		Other resistors	RS1/10S□□□J

BALANCE VR UNIT

Mark	No.	Description	Parts No.
	RESISTOR		
	VR1401	VARIABLE RESISTOR	RCV1072

OPERATION/DISPLAY UNIT

Mark	No.	Description	Parts No.
	SEMICONDUCTORS		
	IC1201	MODE CONTROL MCU	PDB030A
	D1201-1208	DIODE	1SS254
	SWITCHES		
	S1201-1230	SWITCH	RSG1034
	S1231	SWITCH	RSG1032
	COIL		
	L1201	EMI FILTER 222	RTF1165
	CAPACITORS		
	C1201	ELECTR. CAPACITOR	CEAS470M16
	C1202	CERAMIC CAPACITOR	CGCYX473K25
	C1203	ELECTR. CAPACITOR	CEAS220M25
	C1204	CERAMIC CAPACITOR	CKPUYF223Z25
	C1205	CERAMIC CAPACITOR	CGCYX473K25
	C1206	CERAMIC CAPACITOR	CKPUYF223Z25
	RESISTORS		
	R1201	RESISTOR ARRAY (47K)	RCX1045
	R1202	CARBON FILM RESISTOR	RD1/6PM470J
	R1203	RESISTOR ARRAY (47K)	RCX1045
	R1204	RESISTOR ARRAY (47K)	RCX1047
	R1205	RESISTOR ARRAY (47K)	RCX1046

Mark	No.	Description	Parts No.
	R1206	RESISTOR ARRAY (47K)	RCX1045
	R1207	RESISTOR ARRAY (47K)	RCX1046
	R1208, 1209	RESISTOR ARRAY (47K)	RCX1047

OTHERS

Mark	No.	Description	Parts No.
		REMOTE SENSOR UNIT	GP1U52X
	V1201	FL TUBE	RAW1055
	X1201	CERAMIC RESONATOR	VSS1045

TIMER SWITCH UNIT

SWITCHES

Mark	No.	Description	Parts No.
	S1301, 1302	SLIDE SWITCH	RSH1011

HEADPHONE UNIT

SEMICONDUCTORS

Mark	No.	Description	Parts No.
	IC1001	OP-AMP IC	M5216L

CAPACITORS

Mark	No.	Description	Parts No.
	C1003, 1004	CERAMIC CAPACITOR	CGCYX473K25
	C1006, 1007	AUDIO FILM CAPACITOR	CFTXA183J50
	C1008	ELECTR. CAPACITOR	CEAS330M35

RESISTORS

Mark	No.	Description	Parts No.
	VR1001	VARIABLE RESISTOR	PCS1002
		Other resistors	RD1/6PM□□□J

OTHERS

Mark	No.	Description	Parts No.
	JA1001	JACK	RKN1023

TRANS B UNIT

CAPACITORS

Mark	No.	Description	Parts No.
⚠	C301	CERAMIC CAPACITOR	CKCYF103Z50
⚠	C303-313	CERAMIC CAPACITOR	CKCYF103Z50

◉ MAIN UNIT (RWZ2445)

SEMICONDUCTORS

Mark	No.	Description	Parts No.
	IC501	DSP IC	CXD2601AQ
	IC502	SRAM	LH52256N-90L
	IC503	SYSTEM CONTROLLER	PDG070C
	IC504	OP-AMP IC	NJM2902N
	IC505	LOGIC IC	TC74HCU04AP
	IC506, 507	MOTOR DRIVER	LB1687
	IC508	MOTOR DRIVER IC	TA7288P
	IC509	OP-AMP IC	NJM2902N
	IC510	COMPARATOR	LM339
	IC511	SYSTEM RESET IC	M51957AL
	IC512	LOGIC IC	TC74HC08AP
	IC513	LEVELMETER INTERFACE	PD2020
	IC514	LOGIC IC	TC74HC74AP
	IC515	LOGIC IC	TC74HC00AP
	IC516, 517	LOGIC IC	TC74HCU04AP
	IC701, 801	OP-AMP IC	NJM5532DD
⚠	IC901	REGULATOR IC	NJM79M05FA
⚠	IC902	REGULATOR IC	NJM78M05FA
	IC903	A/D CONVERTER IC	CS5339
	IC904	IC	SAA7350
	IC905	LOGIC IC	TC74HC153AP
	IC906	LOGIC IC	TC74HC74AP
	IC907	DIGITAL FILTER,IC	SM5840AP
	IC908	LOGIC IC	TC74HCU04AP
⚠	IC909	REGULATOR IC	NJM78M08FA
	IC910	REGULATOR IC	NJM79M08FA
	IC911	OP-AMP, IC	M5218AP
⚠	Q501	TRANSISTOR	2SA1283
	Q502	TRANSISTOR	2SC1740S
	Q503	TRANSISTOR	2SA933S
	Q504	TRANSISTOR	2SC1740S
	Q505	DIGITAL TRANSISTOR	XDC114ES
	Q506, 507	TRANSISTOR	2SC1740S
	Q508	DIGITAL TRANSISTOR	XDA114ES
	Q509-511	TRANSISTOR	2SC1740S
	Q512	TRANSISTOR	2SA933S
	Q513	DIGITAL TRANSISTOR	XDC114ES
	Q514	TRANSISTOR	2SC1740S
	Q515	TRANSISTOR	2SC3246
	Q516	TRANSISTOR	2SC1740S
	Q517, 518	DIGITAL TRANSISTOR	XDA114ES
	Q519, 520	DIGITAL TRANSISTOR	XDC114ES
	Q521-523	DIGITAL TRANSISTOR	XDA114ES
	Q701, 801	TRANSISTOR	2SD1302
	Q901	DIGITAL TRANSISTOR	XDC114ES
	Q902	TRANSISTOR	DTA143ES
⚠	D501	BRIDGE STACK	S2VB20
	D502	DIODE	1SS254
⚠	D503	RECRIFIER DIODE	1SR35-100A
⚠	D504	ZENER DIODE	MTZJ27C
	D505	ZENER DIODE	MTZJ7.5A
	D506	VARI-CAP	FC63M-1/2/4/5
	D507-509	DIODE	1SS254
	D510, 511	RECRIFIER DIODE	1SR35-100A
	D512	DIODE	1SS254
	D513	ZENER DIODE	MTZJ2.0A
	D514-519	DIODE	1SS254
	D701, 702	DIODE	1SS254
	D801, 802	DIODE	1SS254
⚠	D901-904	DIODE	EL1Z-LFG1

COILS

Mark No.	Description	Parts No.
L501	COIL	RTF1167
L502	COIL	PTL1003
L503	EMI FILTER 101	RTF1162
L504	COIL	RTF1167
L505	COIL	RTF1171
L506	EMI FILTER 222	RTF1165
L507	COIL	RTF1171
L508, 509	EMI FILTER 222	RTF1165
L510	COIL	RTF1171
L511	EMI FILTER 470	RTF1164
L514	EMI FILTER 222	RTF1165
L515	RADIAL INDUCTOR	LFA1R5J
L516	EMI FILTER 222	RTF1165
L520	RADIAL INDUCTOR	LFA151J
L901	EMI FILTER 222	RTF1165
L902	COIL	RTF1171
L903	EMI FILTER 222	RTF1165

CAPACITORS

Mark No.	Description	Parts No.
C501	ELECTROLYTIC CAPACITOR	CEAS472M25
C502	ELECTR. CAPACITOR	CEAS471M10
C503	ELECTROLYTIC CAPACITOR	CEAS471M6R3
C504	ELECTR. CAPACITOR	CEAS101M50
C505	CERAMIC CAPACITOR	CGCYX473K25
C506	ELECTROLYTIC CAPACITOR	CEAS470M35
C507	CERAMIC CAPACITOR	CGCYX103K25
C508	ELECTR. CAPACITOR	CEAS470M16
C509	CERAMIC CAPACITOR	CGCYX473K25
C510	CERAMIC CAPACITOR	CGCYX103K25
C511, 512	CERAMIC CAPACITOR	CGCYX473K25
C513	ELECTR. CAPACITOR	CEAS470M16
C514	CERAMIC CAPACITOR	CKCYB102K50
C515, 516	CERAMIC CAPACITOR	CCCCH100D50
C517	CERAMIC CAPACITOR	CGCYX473K25
C518	CERAMIC CAPACITOR	CCCCH220J50
C519	CERAMIC CAPACITOR	CCCCH270J50
C520	ELECTR. CAPACITOR	CEAS100M50
C521	CERAMIC CAPACITOR	CGCYX473K25
C522	ELECTR. CAPACITOR	CEAS470M16
C523	CERAMIC CAPACITOR	CGDYF104Z25
C524	CERAMIC CAPACITOR	CGCYX103K25
C525	ELECTROLYTIC CAPACITOR	CEAS330M35
C526	CERAMIC CAPACITOR	CGCYF104Z25
C528	CERAMIC CAPACITOR	CGCYX103K25
C529	ELECTROLYTIC CAPACITOR	CEAS330M35
C530, 531	CERAMIC CAPACITOR	CCCCH470J50
C532	CERAMIC CAPACITOR	CGCYX473K25
C533	ELECTR. CAPACITOR	CEAS470M16
C534	CERAMIC CAPACITOR	CGCYF104Z25
C535	CERAMIC CAPACITOR	CGCYX473K25
C536, 537	ELECTR. CAPACITOR	CEAS470M16
C538, 539	CERAMIC CAPACITOR	CGCYX473K25
C540	ELECTR. CAPACITOR	CEAS470M16
C541, 542	CERAMIC CAPACITOR	CGCYX103K25
C543, 544	CERAMIC CAPACITOR	CKCYB222K50
C545	CERAMIC CAPACITOR	CGCYX473K25
C546	ELECTR. CAPACITOR	CEAS470M16
C547	CERAMIC CAPACITOR	CGCYX473K25
C548	CERAMIC CAPACITOR	CCCCH151J50
C550	ELECTR. CAPACITOR	CEAS4R7M50
C551 - 553	CERAMIC CAPACITOR	CGCYX103K25
C554	CERAMIC CAPACITOR	CCCCH220J50
C555	CERAMIC CAPACITOR	CGCYX473K25
C556	ELECTR. CAPACITOR	CEAS470M16
C557	ELECTR. CAPACITOR	CEAS4R7M50
C558	CERAMIC CAPACITOR	CGCYX103K25
C559	ELECTR. CAPACITOR	CEAS470M16
C560	CERAMIC CAPACITOR	CGCYX473K25
C561	ELECTR. CAPACITOR	CEAS470M16
C562	CERAMIC CAPACITOR	CGCYX473K25
C563	ELECTR. CAPACITOR	CEAS100M50
C564	CERAMIC CAPACITOR	CKCYB222K50
C565	ELECTROLYTIC CAPACITOR	CEANP0R1M50
C566	ELECTR. CAPACITOR	CEAS470M16
C567	CERAMIC CAPACITOR	CGCYX473K25
C568	ELECTR. CAPACITOR	CEASR33M50
C569, 570	CERAMIC CAPACITOR	CCCCH470J50
C571, 572	CERAMIC CAPACITOR	CGCYX473K25
C573	ELECTR. CAPACITOR	CEAS470M16
C574	CERAMIC CAPACITOR	CGCYX473K25
C575	CERAMIC CAPACITOR	CGCYX103K25
C576 - 578	CERAMIC CAPACITOR	CGCYX473K25
C579	ELECTR. CAPACITOR	CEAS470M16
C580	CERAMIC CAPACITOR	CGCYX473K25
C581 - 583	CERAMIC CAPACITOR	CGCYX103K25
C584	ELECTR. CAPACITOR	CEAS470M16
C585	CERAMIC CAPACITOR	CGCYX473K25
C586	CERAMIC CAPACITOR	CGCYX103K25
C587 - 589	CERAMIC CAPACITOR	CGCYX473K25
C590	ELECTR. CAPACITOR	CEAS470M16
C591	CERAMIC CAPACITOR	CGCYX473K25
C592 - 594	CERAMIC CAPACITOR	CGCYX103K25
C595	ELECTR. CAPACITOR	CEAS470M16
C596	CERAMIC CAPACITOR	CGCYX473K25
C597	CERAMIC CAPACITOR	CGCYX103K25
C598	CERAMIC CAPACITOR	CKCYB102K50
C599	ELECTR. CAPACITOR	CEASR47M50
C600	CERAMIC CAPACITOR	CCCSL221J50
C601	CERAMIC CAPACITOR	CGCYX473K25
C602	CERAMIC CAPACITOR	CKCYB222K50
C603	CERAMIC CAPACITOR	CGCYX473K25
C604	ELECTR. CAPACITOR	CEAS470M16

Mark	No.	Description	Parts No.
	C605	CERAMIC CAPACITOR	CGCYX473K25
	C606	CERAMIC CAPACITOR	CCDCH101J50
	C607	CERAMIC CAPACITOR	CCCCH910J50
	C608	CERAMIC CAPACITOR	CKCYB472K50
	C609	ELECTR. CAPACITOR	CEAS470M16
⚠	C610	CERAMIC CAPACITOR	CKCYF103Z50
	C612	ELECTROLYTIC CAPACITOR	CEANP100M16
	C620	ELECTROLYTIC CAPACITOR	CEAS470M16
	C701	ELECTROLYTIC CAPACITOR	CENA470M25
	C702	AUDIO FILM CAPACITOR	CFTXA103J50
	C703	ELECTR. CAPACITOR	CEAS470M16
	C704, 705	CERAMIC CAPACITOR	CCCCH390J50
	C706	CERAMIC CAPACITOR	CGCYX473K25
	C707, 708	CERAMIC CAPACITOR	CCCCH560J50
	C709, 710	ELECTROLYTIC CAPACITOR	CENA220M50
	C711	AUDIO FILM CAPACITOR	CFTXA152J50
	C712	AUDIO FILM CAPACITOR	CFTXA682J50
	C713	AUDIO FILM CAPACITOR	CFTXA122J50
	C714	ELECTROLYTIC CAPACITOR	CENA470M50
	C716	ELECTR. CAPACITOR	CEAS470M16
	C717	CERAMIC CAPACITOR	CGCYX473K25
	C718	ELECTR. CAPACITOR	CEAS470M16
	C719	CERAMIC CAPACITOR	CGCYX473K25
	C720	ELECTR. CAPACITOR	CEAS470M16
	C721	CERAMIC CAPACITOR	CGCYX473K25
	C722, 723	CERAMIC CAPACITOR	CCCSL471J50
	C801	ELECTROLYTIC CAPACITOR	CENA470M25
	C802	AUDIO FILM CAPACITOR	CFTXA103J50
	C803	ELECTR. CAPACITOR	CEAS470M16
	C804, 805	CERAMIC CAPACITOR	CCCCH390J50
	C806	CERAMIC CAPACITOR	CGCYX473K25
	C807, 808	CERAMIC CAPACITOR	CCCCH560J50
	C809, 810	ELECTROLYTIC CAPACITOR	CENA220M50
	C811	AUDIO FILM CAPACITOR	CFTXA152J50
	C812	AUDIO FILM CAPACITOR	CFTXA682J50
	C813	AUDIO FILM CAPACITOR	CFTXA122J50
	C814	ELECTROLYTIC CAPACITOR	CENA470M50
	C816	ELECTR. CAPACITOR	CEAS470M16
	C817	CERAMIC CAPACITOR	CGCYX473K25
	C818	ELECTR. CAPACITOR	CEAS470M16
	C819	CERAMIC CAPACITOR	CGCYX473K25

Mark	No.	Description	Parts No.
	C820	ELECTR. CAPACITOR	CEAS470M16
	C821	CERAMIC CAPACITOR	CGCYX473K25
	C822, 823	CERAMIC CAPACITOR	CCCSL471J50
	C901	ELECTR. CAPACITOR	RCH1036
	C902	ELECTR. CAPACITOR	RCH1059
	C903, 904	ELECTROLYTIC CAPACITOR	CENA471M25
	C905	CERAMIC CAPACITOR	CGCYF104Z25
	C906	ELECTROLYTIC CAPACITOR	CENA220M50
	C907	CERAMIC CAPACITOR	CGCYF104Z25
	C908	ELECTROLYTIC CAPACITOR	CENA220M50
	C910	CERAMIC CAPACITOR	CGCYF104Z25
	C911	ELECTR. CAPACITOR	CEAS100M50
	C912	CERAMIC CAPACITOR	CGCYF104Z25
	C913	ELECTR. CAPACITOR	CEAS470M16
	C914	CERAMIC CAPACITOR	CGCYF104Z25
	C915	ELECTR. CAPACITOR	CEAS470M16
	C916	CERAMIC CAPACITOR	CGCYX473K25
	C917	ELECTR. CAPACITOR	CEAS470M16
	C918	CERAMIC CAPACITOR	CGCYF104Z25
	C919, 920	ELECTROLYTIC CAPACITOR	CENA471M25
	C921	CERAMIC CAPACITOR	CCCCH270J50
	C922	CERAMIC CAPACITOR	CCCCH220J50
	C923, 924	ELECTROLYTIC CAPACITOR	CENA220M50
	C925	CERAMIC CAPACITOR	CCCCH101J50
	C926	CERAMIC CAPACITOR	CCDCH101J50

RESISTORS

Mark	No.	Description	Parts No.
	VR501, 504	VR	RCP1047
⚠	R500	FUSIBLE RESISTOR	DCN1003
⚠	R501	CARBON FILM RESISTOR	RD1/2PMF222J
	R538	RESISTOR ARRAY (47K)	RCX1047
	R558	RESISTOR ARRAY (10K)	RCX1048
	R562, 563	METALFILM RESISTOR	RN1/6PQ4701F
	R584	RESISTOR ARRAY (10K)	RCX1048
⚠	R587	CARBON FILM RESISTOR	RD1/2PMF010J
	R590	RESISTOR ARRAY (47K)	RCX1047
⚠	R602, 609	CARBON FILM RESISTOR	RD1/2PMFR47J
	R701	CARBON FILM RESISTOR	RDR1/4PM103J
	R702	CARBON FILM RESISTOR	RDR1/4PM510J
	R710	CARBON FILM RESISTOR	RDR1/4PM561J
	R711, 712	CARBON FILM RESISTOR	RDR1/4PM122J
	R713	CARBON FILM RESISTOR	RDR1/4PM182J

Mark	No.	Description	Parts No.
	R714	CARBON FILM RESISTOR	RDR1/4PM273J
	R715, 716	CARBON FILM RESISTOR	RDR1/4PM471J
	R717	CARBON FILM RESISTOR	RDR1/4PM273J
	R801	CARBON FILM RESISTOR	RDR1/4PM103J
	R802	CARBON FILM RESISTOR	RDR1/4PM510J
	R810	CARBON FILM RESISTOR	RDR1/4PM561J
	R811, 812	CARBON FILM RESISTOR	RDR1/4PM122J
	R813	CARBON FILM RESISTOR	RDR1/4PM182J
	R814	CARBON FILM RESISTOR	RDR1/4PM273J
	R815, 816	CARBON FILM RESISTOR	RDR1/4PM471J
	R817	CARBON FILM RESISTOR	RDR1/4PM273J
	R902	CARBON FILM RESISTOR	RD1/2PM560J
	R903	CARBON FILM RESISTOR	RD1/2PM102J
		Other resistors	RD1/6PM□□□J

OTHERS

Mark	No.	Description	Parts No.
	CN15	CONNECTOR (7P)	KPC7
	CN18	KR CONNECTOR	B12B-PH-K-S
	CN3	FPC CONNECTOR	5597-15CPB
	CN4	FPC CONNECTOR	5597-15CPB
	CN5	FPC CONNECTOR	5597-13CPB
	JA501	OPTICAL SENSOR MODULE	TORX178
	JA502	OPTICAL OUTPUT MODULE	TOTX178
	JA503	JACK	RKB1027
	JA504	JACK	RKB1021
	JA901	JACK	RKB1026
	X501	CRYSTAL RESONATOR 18M	RSS1037
	X502	CRYSTAL RESONATOR 49M	RSS1036
	X901	CRYSTAL RESONATOR 22M	RSS1035

MASTER VR 1 UNIT

SEMICONDUCTORS

Mark	No.	Description	Parts No.
	IC1101	DUAL OP AMP IC	M5238P

CAPACITORS

Mark	No.	Description	Parts No.
	C1101-1104	ELECTROLYTIC CAPACITOR	CENA220M50

RESISTORS

Mark	No.	Description	Parts No.
	VR1101	VARIABLE RESISTOR	RCV1073
		Other resistors	RDR1/4PM□□□J

OTHERS

Mark	No.	Description	Parts No.
	JA1101	JACK	RKB1026

AC-SW UNIT

SWITCHES

Mark	No.	Description	Parts No.
⚠	S401	SWITCH	RSA-063

COIL

Mark	No.	Description	Parts No.
⚠	L401	FILTER	VTL-264

CAPACITORS

Mark	No.	Description	Parts No.
⚠	C401-403	CAPACITOR (CERAMIC)	RCG-009

IC UNIT

SEMICONDUCTORS

Mark	No.	Description	Parts No.
⚠	IC1502	REGULATOR IC	NJM78M05FA
⚠	IC1501	REGULATOR IC	NJM7809FA

6. ADJUSTMENTS

Before adjusting, make sure that :

1. The head and tape running surfaces (tape guide, drum, capstan shaft, pinch roller) are clean.
2. The set has warmed-up a few minutes.
3. The signal level is 0dBv = 1Vrms.
4. A 10kΩ load resistance is connected to the audio system line output terminal.
5. The oscilloscope probe is 10 : 1.

Test Tape

Tracking tape :	SDA-101 (TY-7251)
Level tape :	SDA-102 (TY-7111)
Torque meter FWD :	SDA-104 (TW-7131)
Blank tape :	SDA-302

Adjustments

● Mechanical System Section

1. Back Tension Torque Adjustment
2. Tape Pass Confirmation
3. Tape pass adjustment

● Electrical System Section

1. ATF Recording Current Adjustment
2. TACH Adjustment
3. Error Rate Adjustment

How to Enter the Test Modes

(1) 1.5TP Test Mode

1. Set TIMER SW to PLAY.
2. Press the counter RESET key while pressing the MUTE key.
3. At this time, confirm that the counter display shows "ADJ".
   To cancel this test mode, set the TIMER SW to OFF or press the CHECK key.

Setting the 2/3 Waveform

1. Activate the 1.5TP test mode.
2. Set the INPUT SELECTOR SW to ANALOG. (Forward direction, 2/3 waveform)
3. Check the reproduced waveform. If tracking does not match or is not stable, use the MS + (plus) key and − (minus) key to search for the point at which tracking is stable.
   If the tracking gets worse during searching (in comparison with the initial condition), press the PEAK RESET key and readjust the tracking using the MS + and − keys.

(2) Recording Current Adjusting Test Mode

1. Set the TIMER SW to PLAY.
2. Set the INPUT SELECTOR to ANALOG.
3. Press the MODE key while holding down the MUTE key.
4. Confirm that the P-NO display on the FL tube shows "db".
   To cancel the test mode, press the CHECK key.

Preparations Before Adjustment

1. Remove the bonnet cover.
2. Remove the cassette installation unit and the DAT mechanical unit. (See the section for removing the DAT mechanical unit on page 11.) At this time, do not disconnect the flexible PCB coming out of the DAT mechanical unit from its connector and tighten one screw of the shield case to fix the DAT mechanical unit as shown in Fig. 6-1.
   The mechanical parts can now be adjusted.

Note :
When re-installing the cassette installation unit, after mounting the unit while the cassette entry door on the front panel is open, tighten the five screws. Confirm that the door will smoothly open and close by moving the arm attached to the unit up and down. (See Fig. 6-2.)

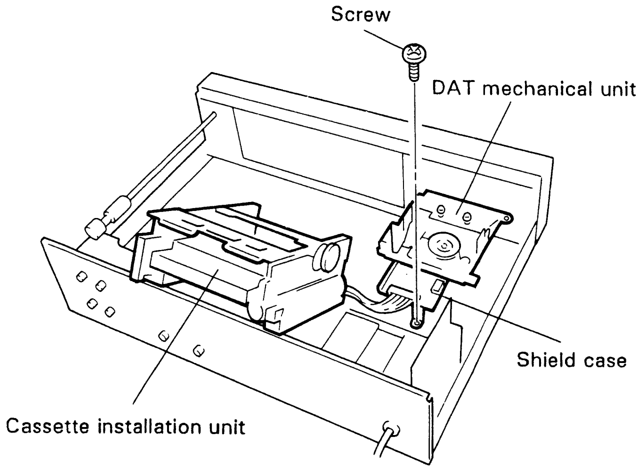

Screw
DAT mechanical unit
Shield case
Cassette installation unit

Fig. 6-1

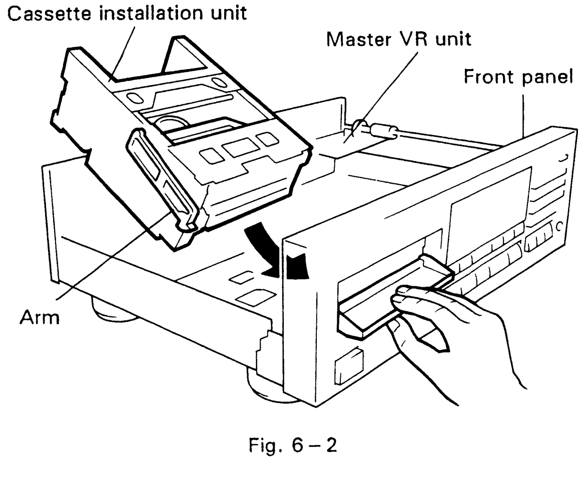

Cassette installation unit
Master VR unit
Front panel
Arm

Fig. 6-2

● Preparation for Inspecting the Main Unit

1. Loosen and remove the snap ring from the volume shaft, and pull out the shaft.
2. Remove the flat cable from the three connectors, loosen and remove the nine screws from the rear panel and one screw from the volume holder, and remove the rear panel.
3. Loosen and remove the nine screws fixing the main unit and stand the main unit board as shown in Fig. 6-3.

Note :

- *For analog recording, remove the master VR unit from the rear panel and connect the flat cable from the master VR unit to CN15. To use the balance VR or headphone, connect the cable to CN16 or CN14, respectively.*
- *To operate this unit with the MAIN unit in an upright position, connect the ground points ①, ② and ③ shown in the figure below to the chassis. To use the master VR unit, connect also the ground point ④ to the chassis.*

Note for re-assembly :
First install the master VR unit in the rear panel, then install the rear panel in the chassis.

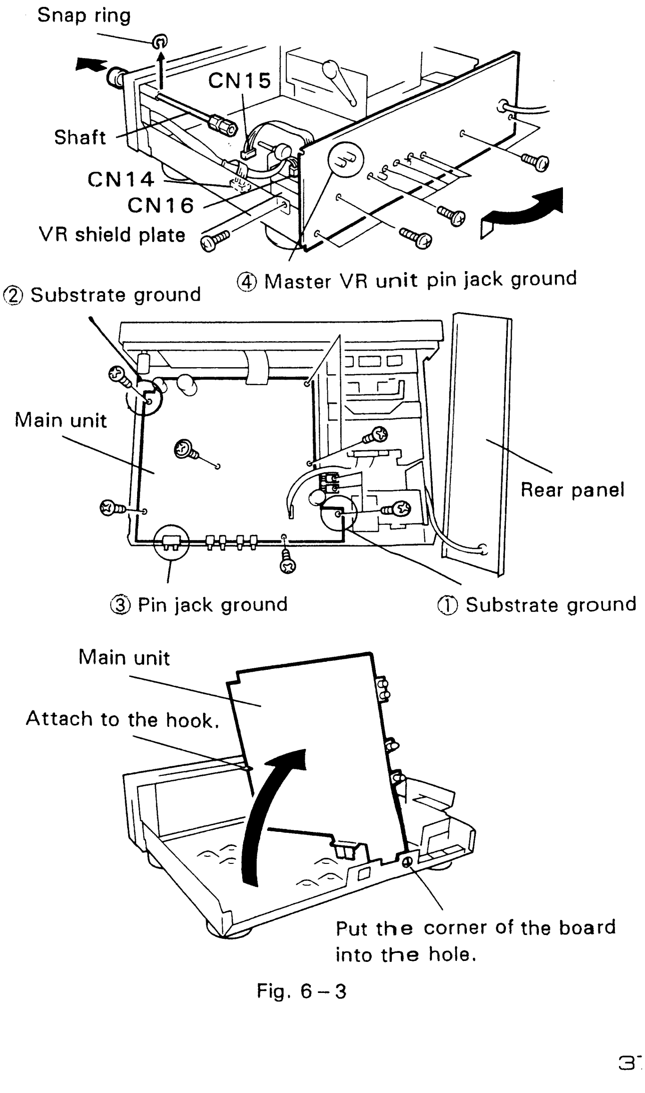

Snap ring
CN15
Shaft
CN14
CN16
VR shield plate
④ Master VR unit pin jack ground
② Substrate ground
Main unit
Rear panel
③ Pin jack ground
① Substrate ground
Main unit
Attach to the hook.
Put the corner of the board into the hole.

Fig. 6-3

6.1 ADJUSTING THE MECHANICAL SYSTEM SECTION

1. Adjusting The Back Tension Torque

Purpose : To stabilize the tape contact with the rotating drum head.
Symptoms in cases of poor adjustment : Small torque → Tape running is unstable.
Large torque → Tape or head is damaged.

Measuring instrument/jig	Measuring instrument connecting section	DAT state	Section to be adjusted
● Torque meter FWD : SDA-104 (TW-7131) ● DAT Cassette weight : R-2606		● PLAY mode	● Spring hook part of the reel base

Adjustment Procedure

Preparation

- Mount the torque meter FWD (SDA-104). (At this time, attach the cassette weight to prevent the tape from moving up.)

1. Press the PLAY key and confirm that the center value of the back tension torque is 6.5 to 9.5g•cm. If the value is out of the specification, adjust positions A to C in the spring hook part of the reel base.

Adjustment diagram

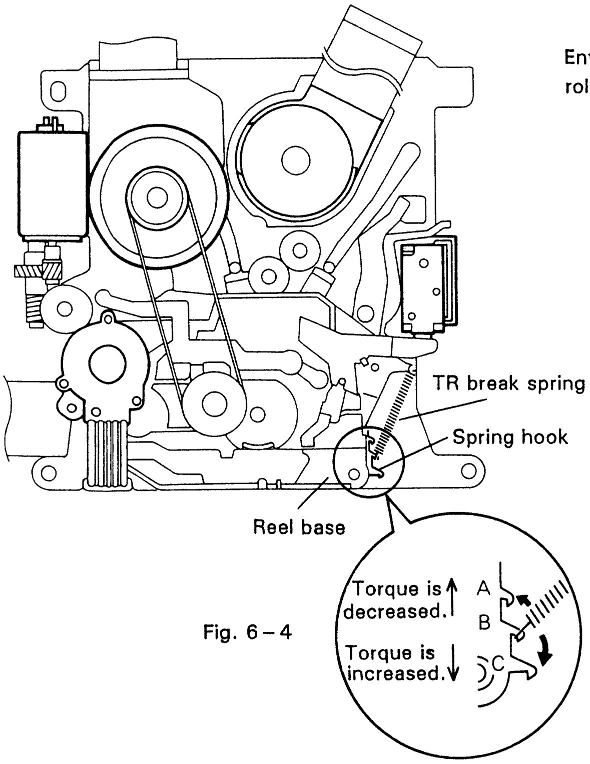

TR break spring
Spring hook
Reel base
Torque is decreased.
Torque is increased.
A
B
C

Fig. 6-4

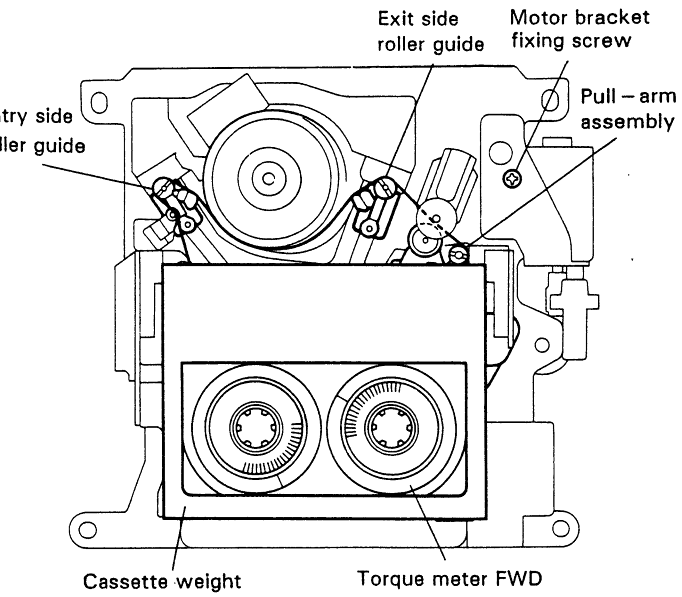

Exit side roller guide
Motor bracket fixing screw
Pull-arm assembly
Entry side roller guide
Cassette weight
Torque meter FWD

Fig. 6-5

2. Tape Pass Confirmation

Purpose : To confirm that tape runs correctly along the leading edge of the drum assembly. (Tape running adjustment)
Symptoms in cases of poor adjustment : Sound is interrupted, noise is generated, or sound quality is decreased.

Measuring instrument/jig	Measuring instrument connecting section	DAT state	Section to be adjusted
● Oscilloscope ● Test tape Tracking : SDA-101 (TY-7251) ● DAT Cassette weight : R-2606	● Oscilloscope In RF unit, CH1 : Between EQOUT (TP201) and RF shield case In main unit, CH2 : Between DREF (CN19-2) and DGND (CN19-1)	● PLAY mode (test mode)	● Waveform check

Adjustment Procedure

Preparation

- Mount the tracking tape (SDA-101). (At this time, attach the cassette weight on the tape.)
- After setting the 1.5 TP test mode, set the 2/3 waveform and play the tape. (See page 36.)

1. Check the waveform using the oscilloscope and confirm that flatness is 75% or more. (At this time, play the tape after confirming that the RECG3 hole of the test tape is open.)
2. If the flatness is less than 75% at this time, execute the tape pass adjustment (page 41).

- Flatness = B/A × 100 [%]

Adjustment diagram

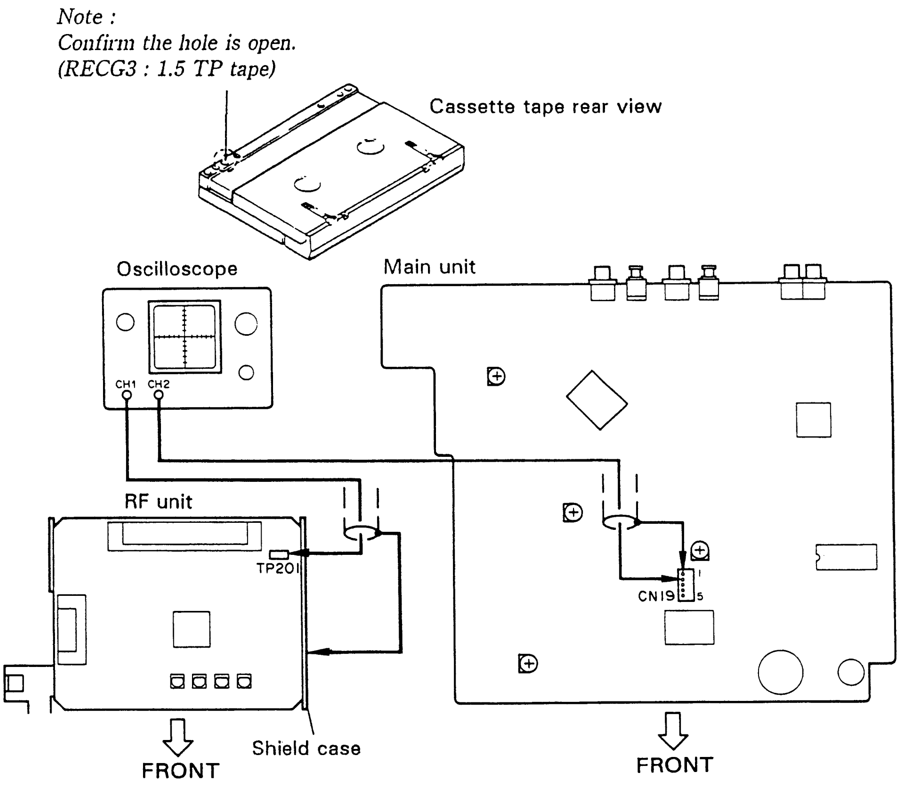

Note :
Confirm the hole is open.
(RECG3 : 1.5 TP tape)
Cassette tape rear view
Oscilloscope
CH1
CH2
Main unit
RF unit
TP201
CN19
1
5
Shield case
FRONT
FRONT

Fig. 6-6

Waveform

- Oscilloscope range :
  50mV/div, 1mS/div

Normal

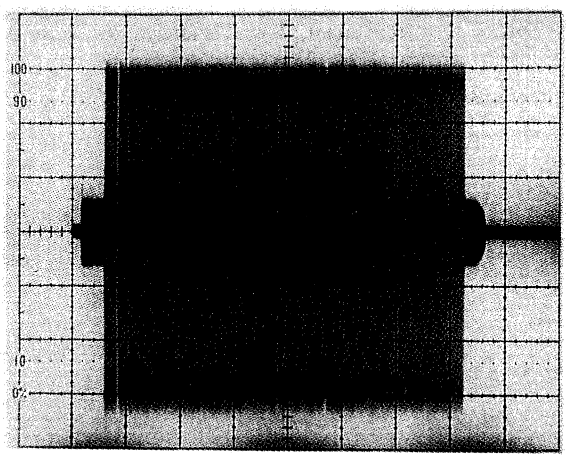


Photo 6 – 1

Fault on the entry side

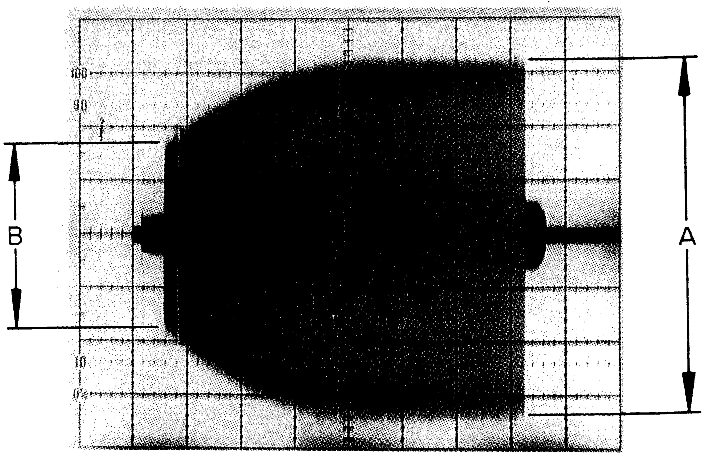


Photo 6 – 2

Fault on the exit side

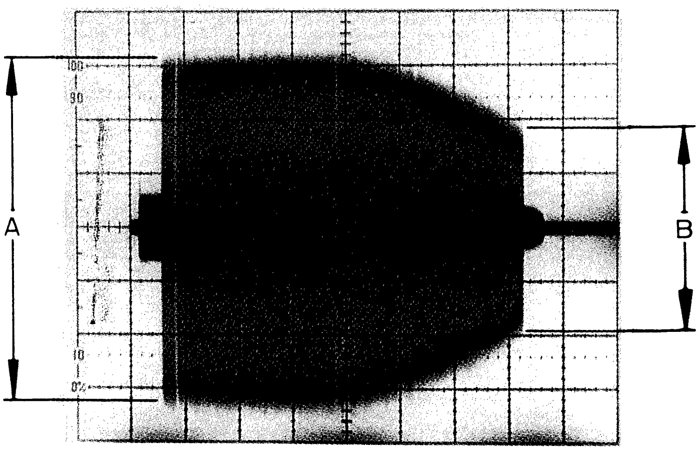


Photo 6 – 3

3. Tape Pass Adjustment

Purpose : To make tape run correctly along the leading edge of the drum assembly.(Tape running adjustment)
Symptoms in cases of poor adjustment : Sound is interrupted, noise is generated, or sound quality is decreased.

Measuring instrument/jig	Measuring instrument connecting section	DAT state	Section to be adjusted
● Oscilloscope ● Test tape Tracking : SDA-101 (TY-7251) ● Pin screwdriver : R-1784 ● 0-bit Phillips screwdriver ● DAT Cassette weight : R-2606	● Oscilloscope In RF unit, CH1 : Between EQOUT (TP201) and RF shield case In main unit, CH2 : Between DREF (CN19-2) and DGND (CN19-1)	● PLAY mode	● Roller guide (entry side, exit side) ● Pull guide

Adjustment Procedure

3.1 Coarse adjustment of each guide

1. After rotating the roller guides on the entry and exit sides clockwise (using the pin screwdriver (R-1784)) until the guides slightly touch the end, rotate the guides in the reverse direction about one rotation.
2. Rotate the guide flange to the point at which the guide flange top face of the pull-arm assembly matches the upper end of the pull-arm shaft. (See Fig. 6-7.)

3.2 Fine adjustment of the roller guide height

Preparation

- Mount the tracking tape (SDA-101). (Attach the cassette weight on the tape.)
- After setting the 1.5TP test mode, set the 2/3 waveform and play the tape. (See page 36.)
- Confirm that the RECG3 hole of the test tape is open. (See Fig. 6-8.)

[Exit Side Adjustment]

1. Check the RF waveform. Photo 6-7, tighten the roller guide on the exit side (about 1/8 rotation). Photo 6-9, loosen the roller guide on the exit side (about 1/8 rotation).

[Entry Side Adjustment]

2. Check the RF waveform. Photo 6-6, tighten the roller guide on the entry side (about 1/4 rotation). Photo 6-8, loosen the roller guide on the entry side (about 1/4 rotation).
3. Observe the RF waveform and repeat Steps 1 and 2 until the RF waveform matches Photo 6-5.
4. Press the OPEN/CLOSE key to eject the tape, and execute the tape pass confirmation procedure (page 39) again.

Adjustment diagram

- Connections of the oscilloscope, etc., are the same as in Section 2, Tape Pass Confirmation (page 39).

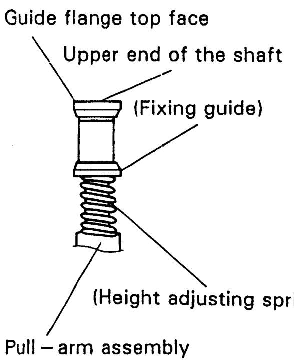
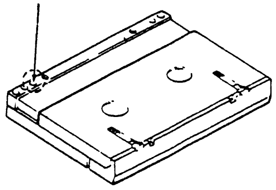


Fig. 6-7

Note :
Confirm the hole is open.
(RECG3 : 1.5 TP tape)



Cassette tape rear view

Fig. 6-8

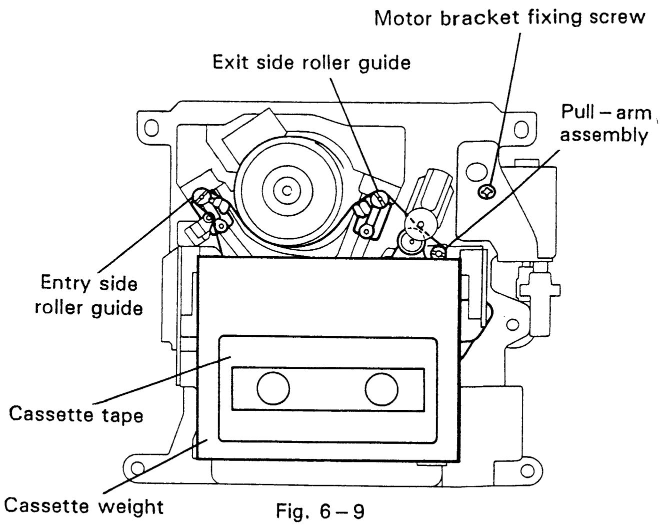


Fig. 6-9

Waveform

- Oscilloscope range :
  50 mV/div, 1 mS/div

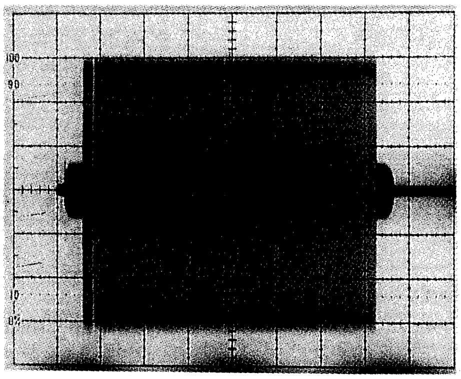


Photo 6 – 4 Maximum RF output level

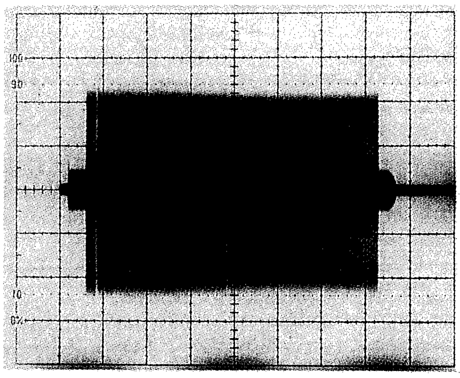


Photo 6 – 5 2/3 RF output level (adjustment completed)

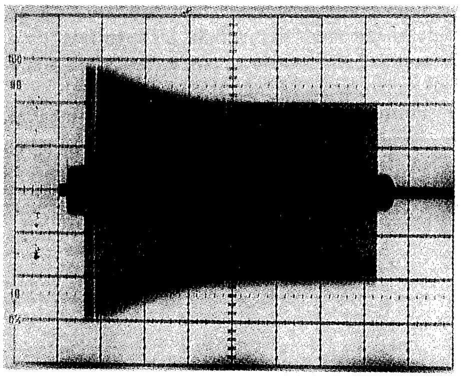


Photo 6 – 6 Entry side guide roller raised too much

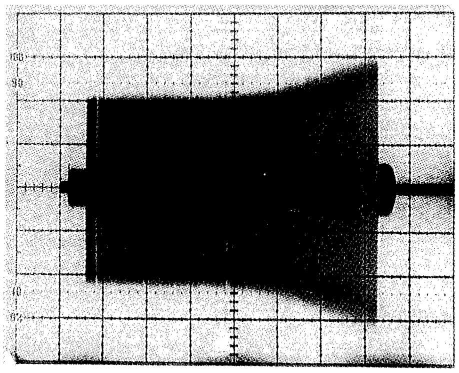


Photo 6 – 7 Exit side guide roller raised too much

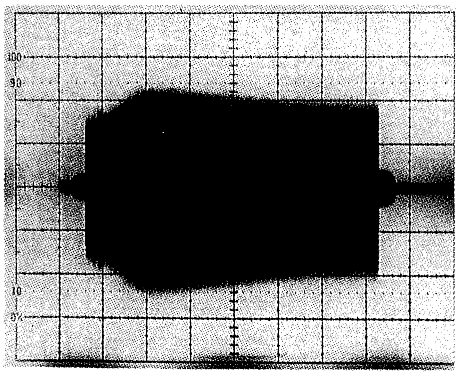


Photo 6 – 8 Entry side guide roller lowered too much

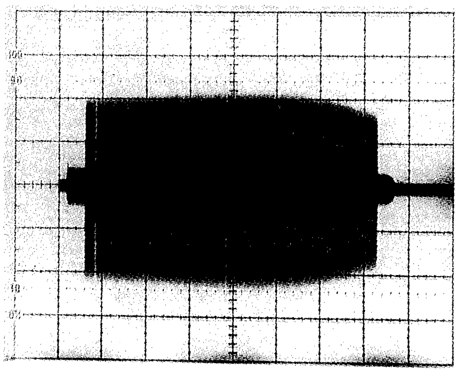


Photo 6 – 9 Exit side guide roller lowered too much

3.3 Pull-guide fine adjustment

1. Play tape and set the CUE mode by continuously pressing the FF/CUE key when the tape starts winding. Observe the tape torsion between the pinch roller and pull-guide by viewing the image of the head of the screw fixing the motor bracket reflected on the magnetic surface of the tape. The relationship between the reflected image of the screw head and pull-guide flange height is shown in Fig. 6-10.
2. Slowly tighten the pull-guide flange 180 degrees from the position where the coarse adjustment was performed. Confirm that the reflected image changes from c to a in the process of tightening.
3. On the contrary, loosen the pull-guide flange 180 degrees and confirm that the reflected image changes from a to c in the process of loosening.
4. Tighten the pull-guide flange to the b condition in which the upper edge of the tape curls slightly, and then loosen it 90 degrees.
5. Keep pressing the REW/REV key to set the REW mode and confirm that the tape does not curl in sections A and B in Fig. 6-11.
6. After confirming that no torsion appears on the tape in section C in Fig. 6-12, check the torsion and bulge (convex shape) in section D. (Normally, the bulge is 0.5mm or less.)
7. After pressing the OPEN/CLOSE key to eject the tape, play the tape again, keep pressing the FF/CUE key, and observe again the reflected image of the screw head to confirm that it is in the c condition.
8. Keep pressing the REW/REV key and confirm that curl and torsion in sections A to D are the same.
9. Apply a locking glue to the screw on the top face of the pull-guide flange and lock the screw.

Adjustment diagram

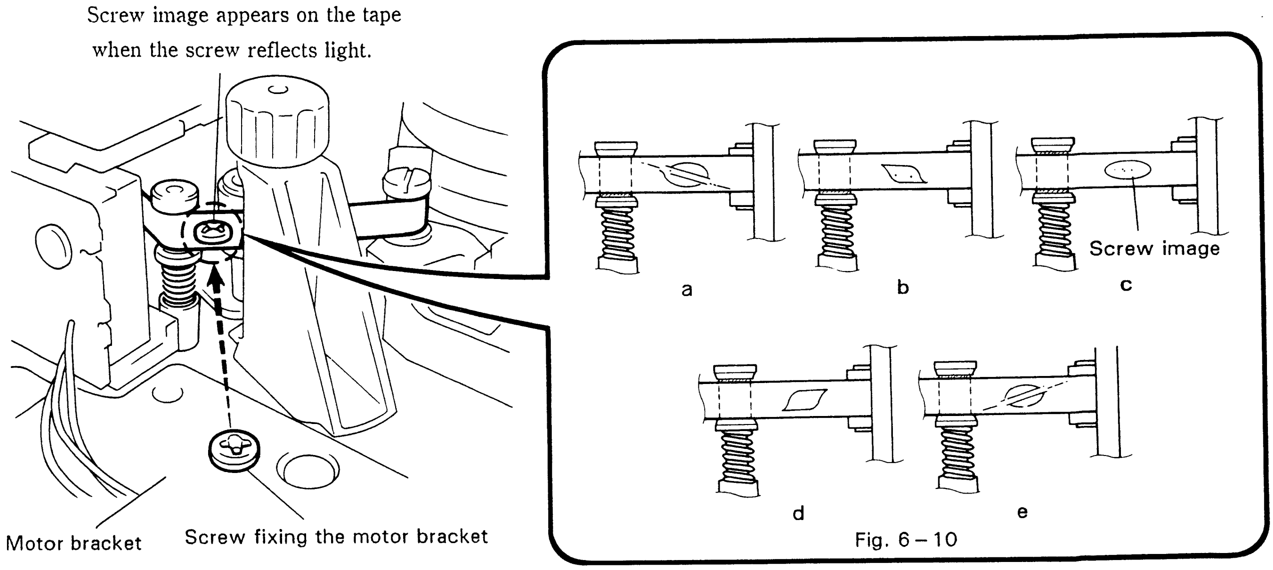

Screw image appears on the tape
when the screw reflects light.
Screw image
a
b
c
d
e
Motor bracket
Screw fixing the motor bracket

Fig. 6-10

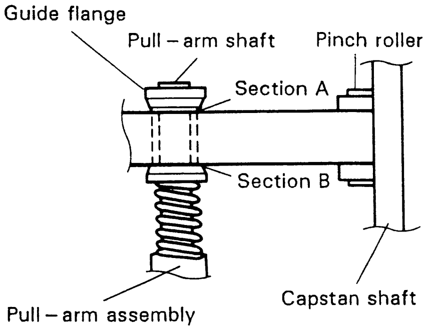

Guide flange
Pull-arm shaft
Pinch roller
Section A
Section B
Pull-arm assembly
Capstan shaft

Fig. 6-11

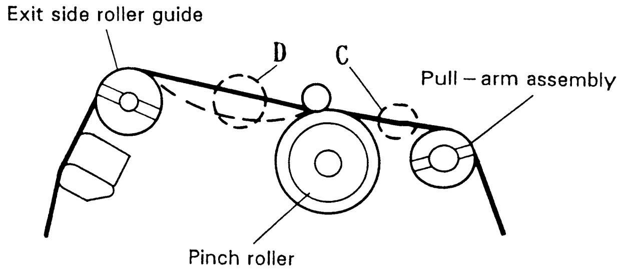

Exit side roller guide
D
C
Pull-arm assembly
Pinch roller

Fig. 6-12

6.2 ADJUSTING THE ELECTRICAL SYSTEM SECTION

1. Adjusting ATF Recording Current

Purpose : To adjust the optimum recording current.
Symptoms in cases of poor adjustment : Sound interrupted (tracking cannot be matched.), noise.

Measuring instrument/jig	Measuring instrument connecting section	DAT state	Section to be adjusted
● Oscilloscope ● Test tape Level : SDA-102 (TY-7111) Blank : SDA-302 *Note :* *Use an unused part in which the RF signal is not recorded.*	● Oscilloscope In main unit, CH1 : Between PLENV (CN19-3) and DGND (CN19-1) CH2 : Between DREF (CN19-2) and DGND (CN19-1)	● PLAY and REC modes	● In RF unit VR203 (head A) VR204 (head B)

Adjustment Procedure

Preparation

- Set the test mode for recording current adjustment. (See page 36.)

1. Play the level test tape (SDA-102), measure and record the voltage in sections a and b of the waveform in Photo 6-10.
2. Confirm the blank tape (SDA-302) is unused or has an unused portion. Press the REC key and then PAUSE key so that the signal from the integral transmitter in the machine will be recorded for 30 to 60 seconds.
3. After recording is stopped, rewind the part recorded in Step 2, and confirm that the levels of the reproduced waveforms are within the range of + 25% and − 20% of levels a and b recorded in Step 1. (See Photo 6-11.)
4. If the levels are out of the range in Step 3, slightly rotate VR203 for head A and VR204 for head B, and record the signal again on the unused part of the blank tape. Then, execute Step 3.
5. Repeat Steps 3 and 4 until the levels are in the range specified in Step 3.

Adjustment diagram

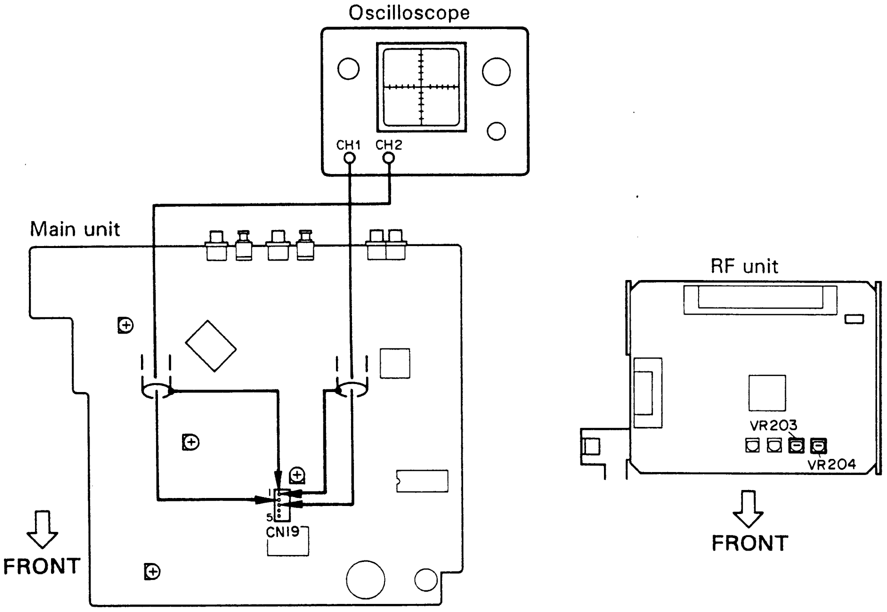


Fig. 6-13

Waveform

Oscilloscope range
CH1 : 0.5V/div, 2.5mS/div
CH2 : 5V/div

During playback of level tape (SDA – 102)

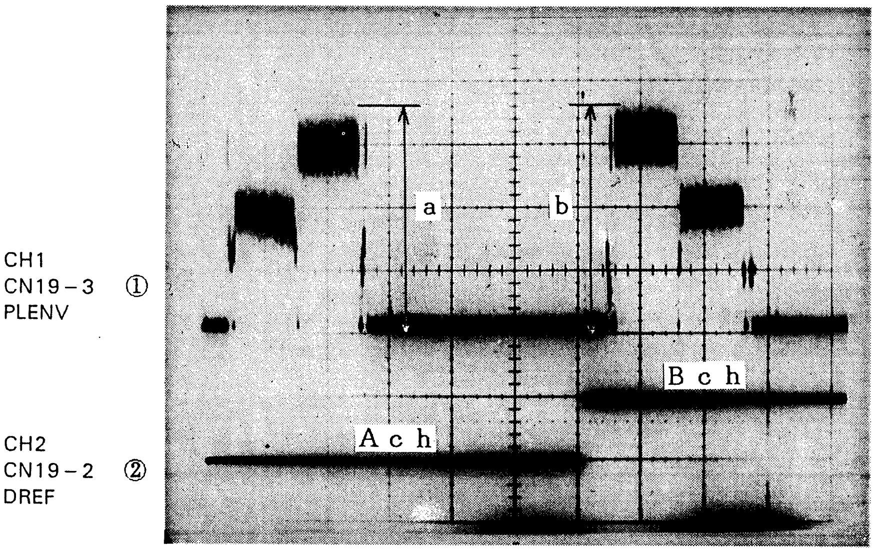


Photo 6 – 10

During playback of self – recorded blank tape

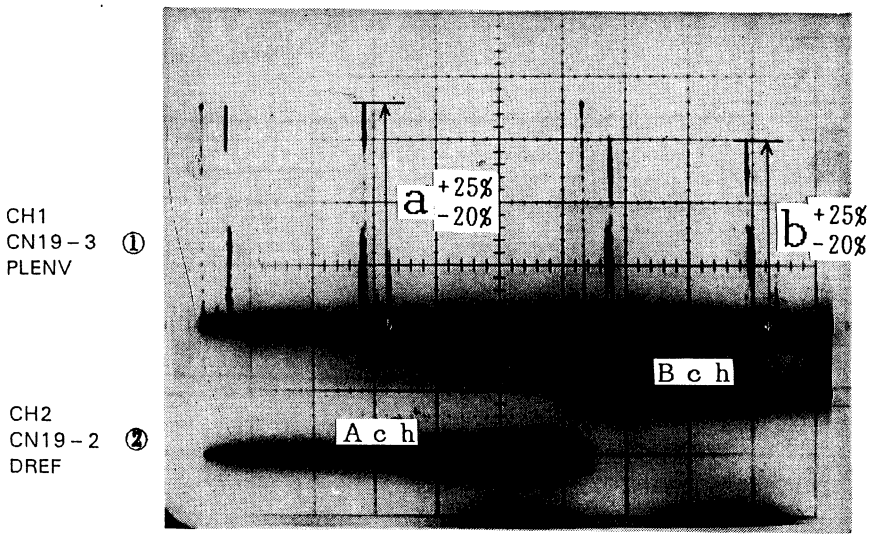


Photo 6 – 11

2. Adjusting TACH

Purpose : To match the recording position to the tape format.
Symptoms in cases of poor adjustment : Sound from the tape recorded with another machine is interrupted (no problem with self-recording) or noise is increased to mute the recorded sound.

Measuring instrument/jig	Measuring instrument connecting section	DAT state	Section to be adjusted
● Oscilloscope ● Test tape Tracking : SDA-101 (TY-7251)	● Oscilloscope In RF unit, CH1 : Between EQOUT (TP201) and RF shield case In main unit, CH2 : Between DREF (CN19-2) and DGND (CN19-1)	● PLAY mode (test mode)	● In main unit : VR501

Adjustment Procedure

Preparation

- Set the 1.5 TP test mode. (See page 36.)

1. Adjust so that the marker position of the RF waveform will be 650μs±20 starting with the trailing edge of the DREF waveform.

Waveform

- Oscilloscope range
  CH1 : 100 mV/div, 0.1 mS/div
  CH2 : 5 V/div (trigger)

Adjustment diagram

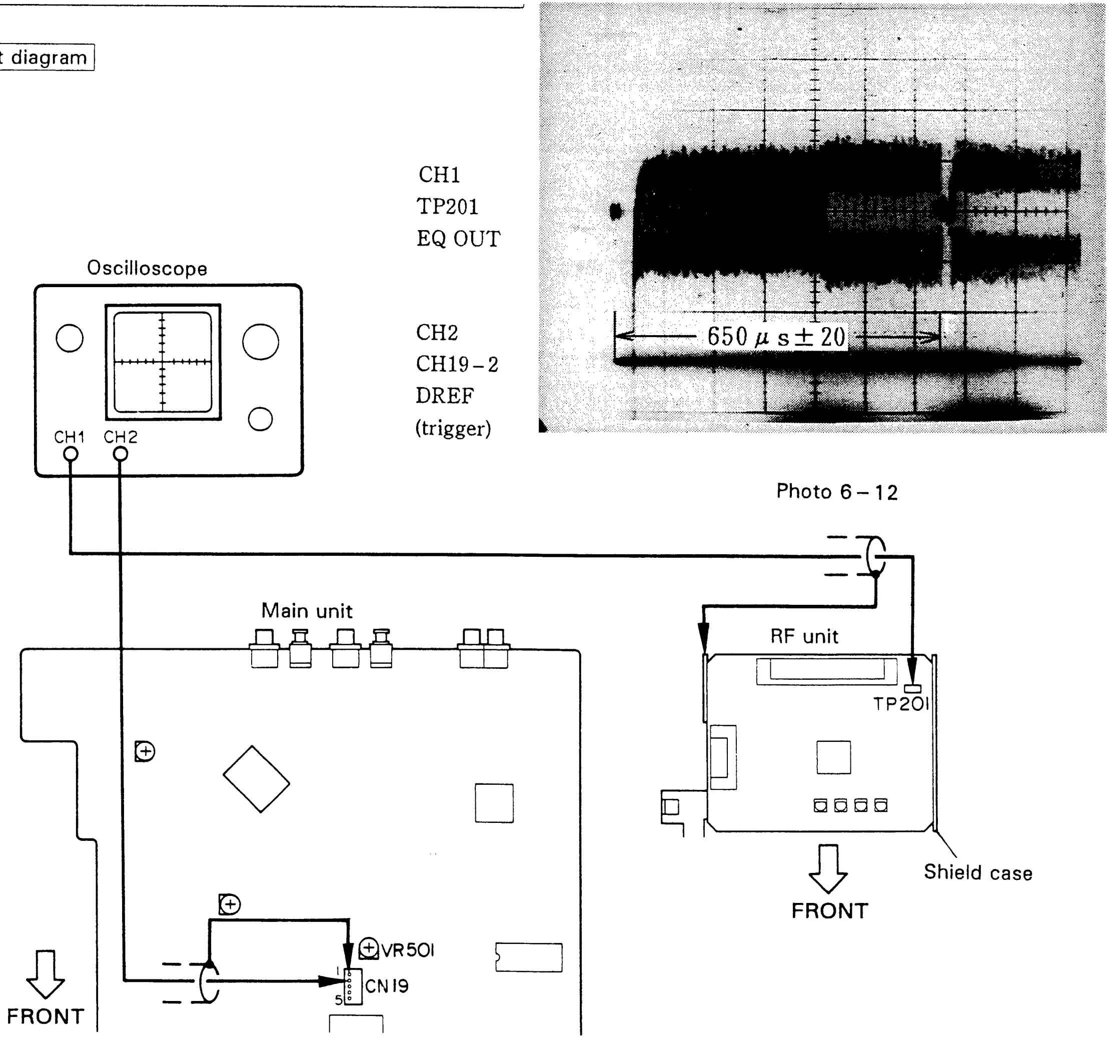

CH1
TP201
EQ OUT
CH2
CH19-2
DREF
(trigger)
650 μ s ± 20
Oscilloscope
CH1
CH2
Main unit
RF unit
TP201
VR501
CN19
1
5
Shield case
FRONT
FRONT

Photo 6-12

Fig. 6-14

3. Adjusting the Error Rate

Purpose : To correctly reproduce data.
Symptoms in cases of poor adjustment : Tracking does not match, running failure occurs, sound is muted, or noise is generated.

Measuring instrument/jig	Measuring instrument connecting section	DAT state	Section to be adjusted
● Oscilloscope ● Blank tape : SDA-302	● Oscilloscope In main unit, CH1 : Between SYMN (JP (ERR FLG) or IC501-33pin) and DGND (CN19-1) CH2 : Between DREF (CN19-2) and DGND (CN19-1)	● REC and PLAY modes	● In main unit : VR504

Adjustment Procedure

Preparation

- Record a music signal or a proper test signal on the blank tape (SDA-302) in SP and LP modes for about 15 seconds, respectively.

1. Play the recorded part and adjust so that the error flag appears the most (72 peaks at maximum) on the waveform of the oscilloscope as shown in Photo 6-13.

Waveform

- Oscilloscope range
  CH1 : 5 V/div, 2.5 mS/div
  CH2 :

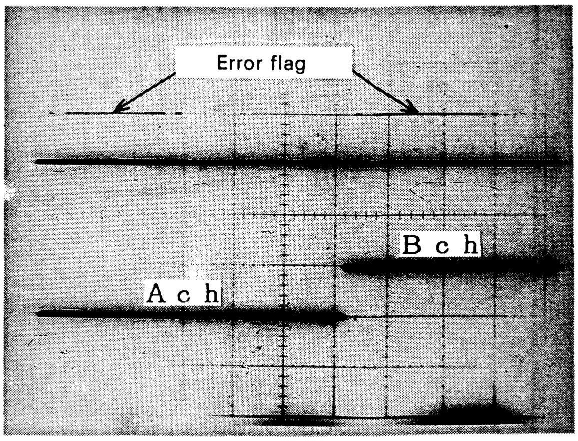
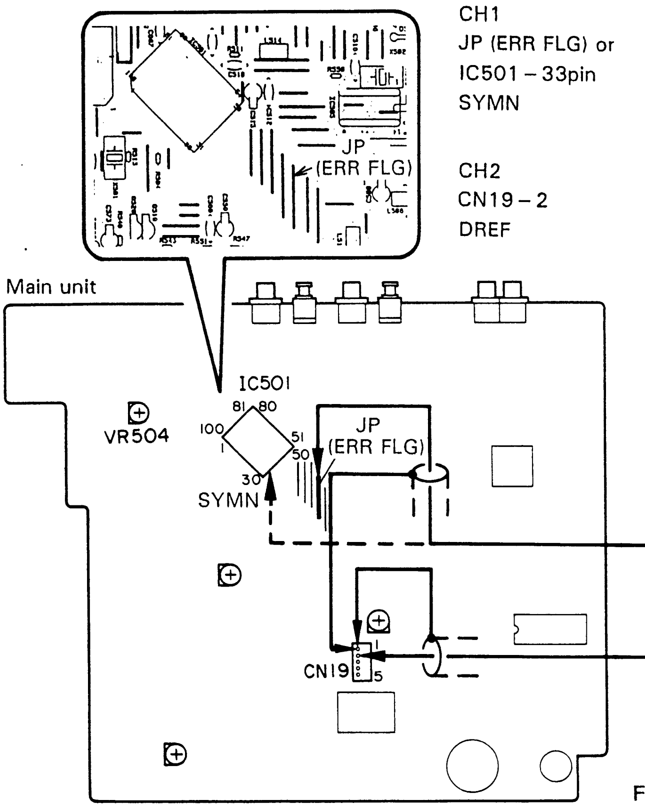


Photo 6-13

Adjustment diagram


CH1
JP (ERR FLG) or
IC501-33pin
SYMN
JP
(ERR FLG)
CH2
CN19-2
DREF
Main unit
VR504
IC501
81
80
100
1
51
50
30
SYMN
JP
(ERR FLG)
CN19
1
5

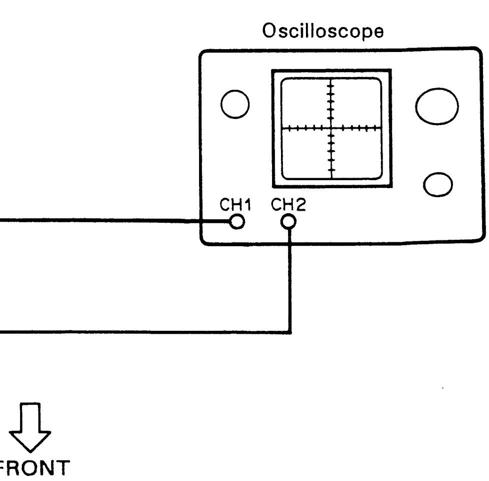

Oscilloscope
CH1
CH2
FRONT

Fig. 6-15

Waveform

- Oscilloscope range
  CH1 : 5V/div, 1mS/div

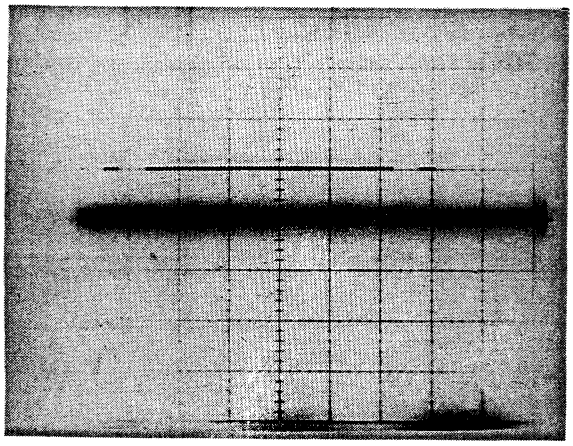


Photo 6-14

[Very good]
- Error rate : 1 × 10^{-4}
  CH1 : SYMN (JP (ERR FLG) or IC501-33pin)

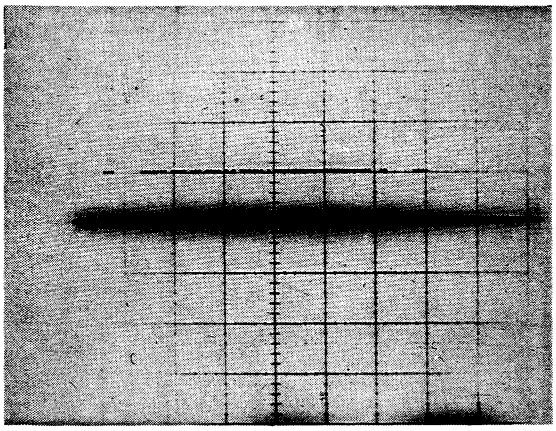


Photo 6-15

[Error is corrected and sound is normal]
- Error rate : 1 × 10^{-2}
  CH1 : SYMN (JP (ERR FLG) or IC501-33pin)

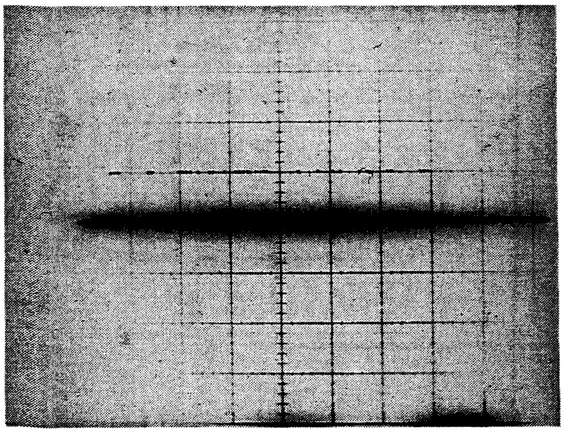


Photo 6-16

[Sound signal is interpolated and abnormal when listened to carefully]
- Error rate : 1 × 10^{-1}
  CH1 : SYMN (JP (ERR FLG) or IC501-33pin)

6. REGLAGE

Avant de procéder au réglage, vérifier que :

1. La tête et les surfaces de défilement de la bande (guide de bande, tambour, arbre de cabestan, galet-presseur) sont propres.
2. L'ensemble a chauffé pendant quelques minutes.
3. Le niveau de signal est de 0 dBv = 1 V eff.
4. Une résistance de charge de 10 kohms est connectée à la borne de sortie de ligne du système audio.
5. La sonde de l'oscilloscope est 10 : 1.

Bande d'essai

Bande d'alignement :	SDA-101 (TY-7251)
Bande de niveau :	SDA-102 (TY-7111)
Compteur de couple FWD :	SDA-104 (TY-7131)
Bande vierge :	SDA-302

Réglages

● Section de système mécanique

1. Réglage du couple de tension arrière
2. Confirmation du passage de bande
3. Réglage du passage de bande

● Section de système électrique

1. Réglage du courant d'enregistrement ATF
2. Réglage du compte-tours
3. Réglage du taux d'erreur

Comment passer aux modes d'essai

(1) Mode d'essai TP 1,5

1. Régler le commutateur de minuterie sur la position "PLAY" (reproduction).
2. Appuyer sur la touche de réinitialisation (RESET) de compteur tout en appuyant sur la touche de sourdine (MUTE).
3. A ce moment, confirmer que l'affichage de compteur indique "ADJ".
   Pour annuler ce mode d'essai, régler l'interupteur d'alimentation sur la position "OFF" ou appuyer sur la touche de contrôle (CHECK).

Réglage de la forme d'onde 2/3

1. Activer le mode d'essai TP 1,5.
2. Régler le sélecteur d'entrée sur la position "ANALOG". (Direction en avant, forme d'onde 2/3)
3. Vérifier la forme d'onde reproduite. Si l'alignement ne correspond pas ou n'est pas stable, utiliser la touche + (plus) et − (moins) MS pour chercher le point auquel l'alignement est stable.
   Si l'alignement devient pire pendant la recherche (par comparaison avec la condition initiale), appuyer sur la touche de contrôle (PEAK RESET) et ré-ajuster l'alignement en utilisant les touches + et − MS.

(2) Mode d'essai de réglage du courant d'enregistrement

1. Régler le commutateur de minuterie sur la position "PLAY".
2. Régler le sélecteur d'entrée sur la position "ANALOG".
3. Appuyer sur la touche de mode (MODE) tout en maintenant la touche de sourdine (MUTE) enfoncée.
4. Confirmer que l'affichage "P-NO" sur le tube FL indique "db".
   Pour annuler le mode d'essai, appuyer sur la touche de contrôle (CHECK).

Préparations avant le réglage

1. Déposer le couvercle.
2. Déposer l'unité d'installation de cassette et l'appareil mécanique DAT. (Voir la section pour la déposer de l'appareil mécanique DAT à la page 11.) A ce moment, ne pas déconnecter la plaquette de circuits imprimés souple sortant de l'appareil mécanique DAT de son connecteur et serrer une vis sur le boîtier de blindage pour fixer l'appareil mécanique DAT de la manière indiquée dans la Figure 6 – 1. Les pièces mécaniques peuvent à présent être ajustées.

Note :

Lors de la remise en place de l'unité d'installation de cassette après le montage de l'appareil alors que la porte d'entrée de cassette située sur le panneau avant est ouverte, serrer les cinq vis. Confirmer que la porte s'ouvre en douceur et fermer en déplaçant le bras fixé à l'appareil vers le haut et le bas. (Voir Figure 6 – 2.)

● Préparations au contrôle de l'unité principale

1. Desserrer et déposer le jonc de l'arbre de volume, et sortir l'arbre.
2. Déposer le câble plat des trois connecteurs, desserrer et déposer les neuf vis du panneau arrière et une vis du support de volume, et déposer le panneau arrière.
3. Desserrer et déposer les neuf vis fixant l'unité principale et supporter celle – ci de la manière indiquée dans la Figure 6 – 3.

Note :

- *Pour l'enregistrement analogique, déposer l'unité de résistance variable principale du panneau arrière et connecter le câble plat de l'unité de résistance variable principale à CN15. Pour utiliser la résistance variable de balance ou le casque d'écoute, connecter respectivement le câble à CN16 ou CN14.*
- *Pour utiliser cet appareil en position verticale avec l'appareil principal, connecter les points de mise à la terre ①, ② et ③ indiqués dans la figure ci – dessous au châssis. Pour utiliser l'unité VR principale, connecter également le point de mise à la terre ④ au châssis.*

Note pour le remontage :

Reposer tout d'abord l'unité de résistance variable principale dans le panneau arrière, puis reposer le panneau arrière dans le châssis.

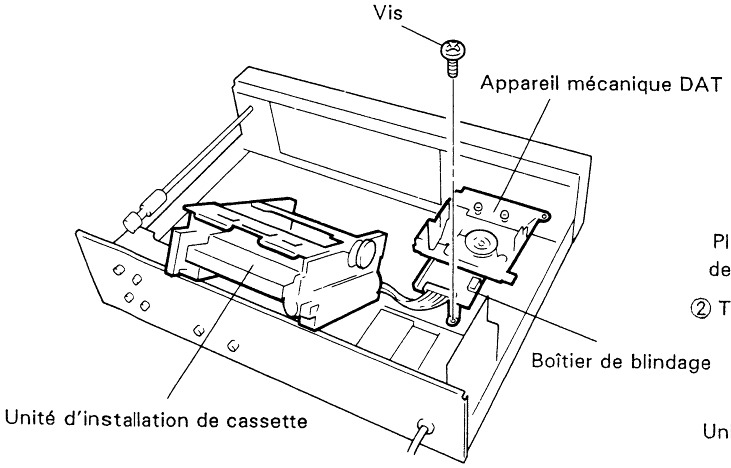

Vis
Appareil mécanique DAT
Boîtier de blindage
Unité d'installation de cassette

Figure 6 – 1

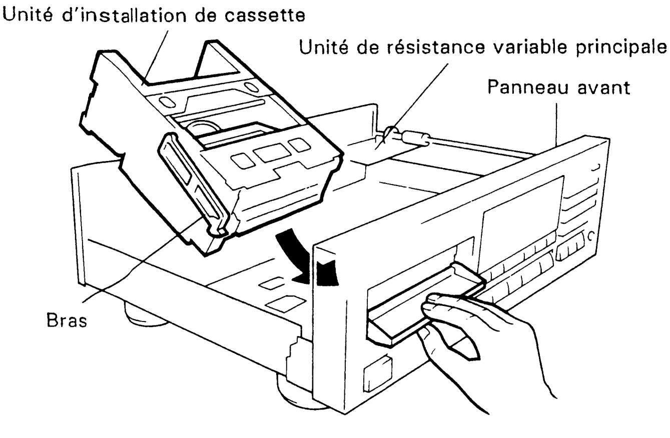
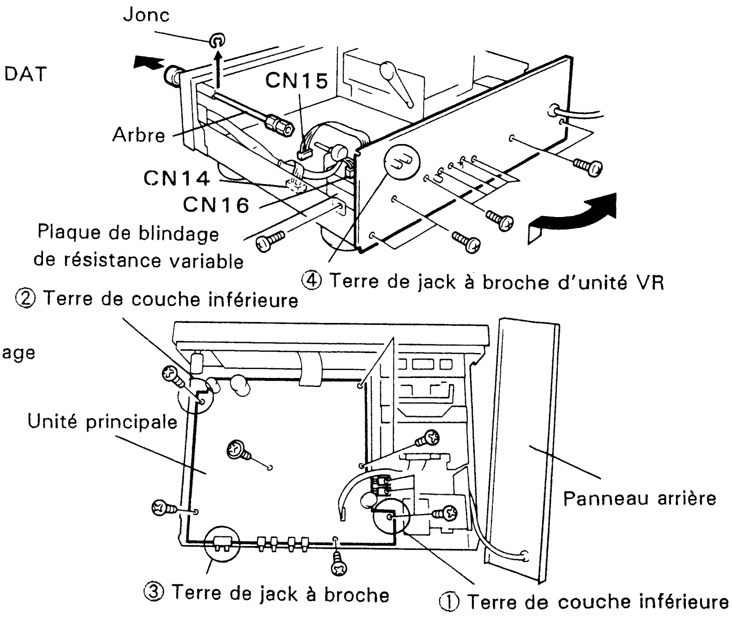

Unité d'installation de cassette
Unité de résistance variable principale
Panneau avant
Bras

Figure 6 – 2


Jonc
CN15
Arbre
CN14
CN16
Plaque de blindage de résistance variable
④ Terre de jack à broche d'unité VR
② Terre de couche inférieure
Unité principale
Panneau arrière
③ Terre de jack à broche
① Terre de couche inférieure

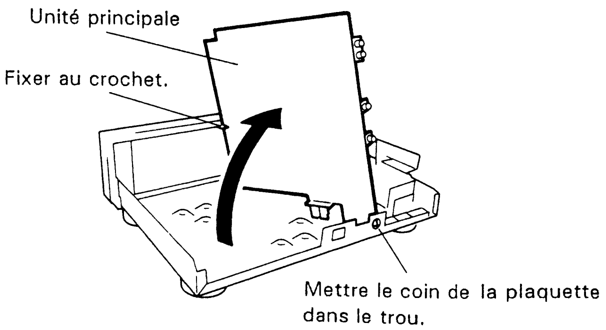

Unité principale
Fixer au crochet.
Mettre le coin de la plaquette dans le trou.

Figure 6 – 3

6.1 Réglage de la section de système mécanique

1.Réglage du couple de tension arrière

But : Stabiliser le contact de bande avec la tête de tambour rotative.
Symptômes en cas de mauvais ajustement : Petit couple → Le défilement de bande est instable.
Large couple → Le défilement de bande est endommagé.

Gabarit/instrument de mesure	Section de connexion d'instrument de mesure	Etat DAT	Section à ajuster
● Compteur de couple FWD : SDA-104 (TW-7131) ● Poids de cassette DAT : R-2606		● Mode de reproduction (PLAY)	● Partie crochet à ressort de la base de bobine

Procédure de réglage

Préparation

- Monter le compteur de couple FWD (SDA-104). (A ce moment, fixer le poids de cassette pour empêcher la bande de se déplacer.)

1. Appuyer sur la touche de reproduction (PLAY) et confirmer que la valeur centrale du couple de tension arrière est de 6,5 à 9,5 g•cm. Si la valeur est hors spécifications, ajuster les positions A à C dans la partie crochet à ressort de la base de bobine.

Diagramme de réglage

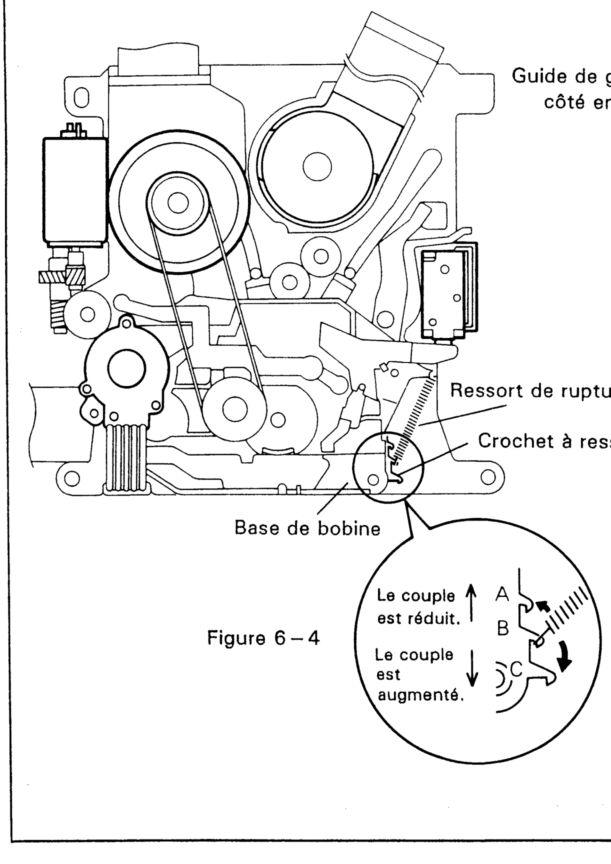

Ressort de rupture TR
Crochet à ressort
Base de bobine
Le couple est réduit.
A
B
Le couple est augmenté.
C

Figure 6 – 4

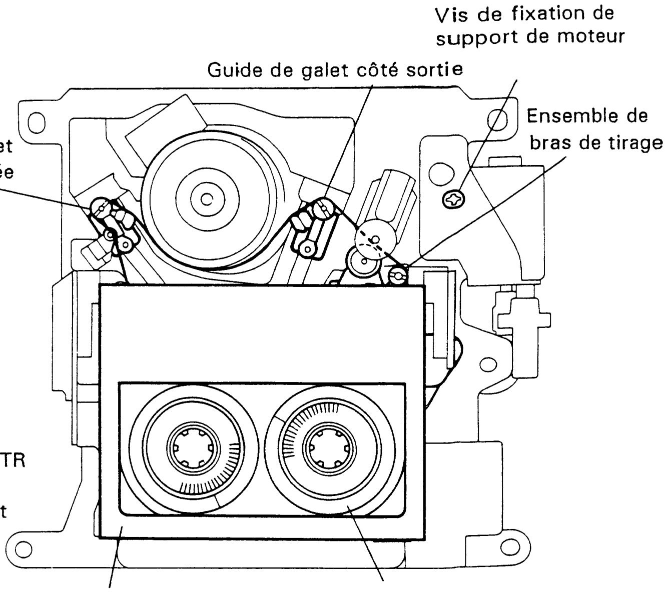

Vis de fixation de support de moteur
Guide de galet côté sortie
Ensemble de bras de tirage
Guide de galet côté entrée
Poids de cassette
Compteur de couple FWD

Figure 6 – 5

2. Confirmation du passage de bande

But : Confirmer que la bande défile correctement le long du bord de tête de l'ensemble de tambour. (Ajustement de défilement de bande)
Symptômes en cas de mauvais ajustement : Le son est interrompu, des parasites sont produits ou la qualité sonore est réduite.

Gabarit/instrument de mesure	Section de connexion d'instrument de mesure	Etat DAT	Section à ajuster
● Oscilloscope ● Bande d'essai Bande d'alignement : SDA-101 (TY-7251) ● Poids de cassette DAT : R-2606	● Oscilloscope Dans l'unité RF, CH1 : Entre EQOUT (TP201) et boîtier de blindage RF Dans l'unité principale, CH2 : Entre DREF (CN19-2) et DGND (CN19-1)	● Mode de reproduction (mode d'essai)	● Contrôle de forme d'onde

Procédure de réglage

Préparation

- Monter la bande d'alignement (SDA-101). (A ce moment, fixer le poids de cassette sur la bande.)
- Après avoir réglé le mode d'essai TP 1,5, régler la forme d'onde 2/3 et reproduire la bande. (Voir page 49.)

1. Vérifier la forme d'onde en utilisant l'oscilloscope et confirmer que la planéité est supérieure ou égale à 75%. (A ce moment, reproduire la bande après avoir confirmé que le trou RECG3 de la bande d'essai est ouvert.)
2. Si la planéité est inférieure à ce moment à 75%, exécuter l'ajustement du passage de bande (page 54).

- Planéité = B/A × 100 [%]

Diagramme de réglage

Note :
Confirmer que le trou est ouvert.
(RECG3 : Bande TP 1,5)

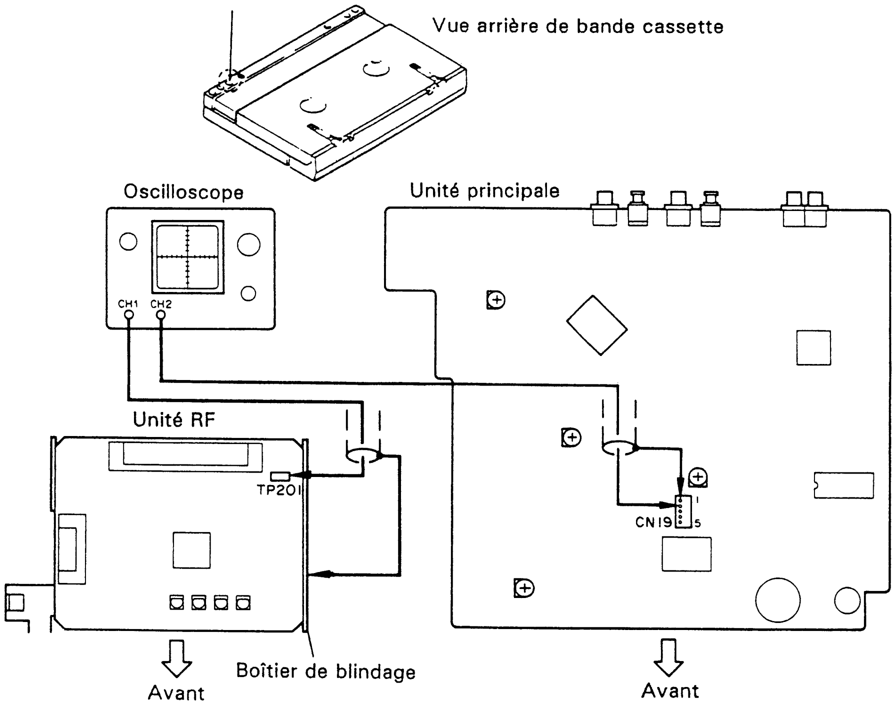


Figure 6-6

Forme d'onde

- Gamme de l'oscilloscope :
  50 mV/div, 1 mS/div

Normal

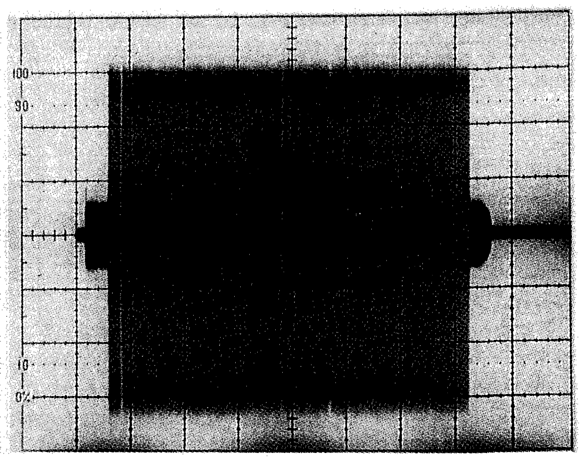


Photo 6 – 1

Défaut sur le côté entrée

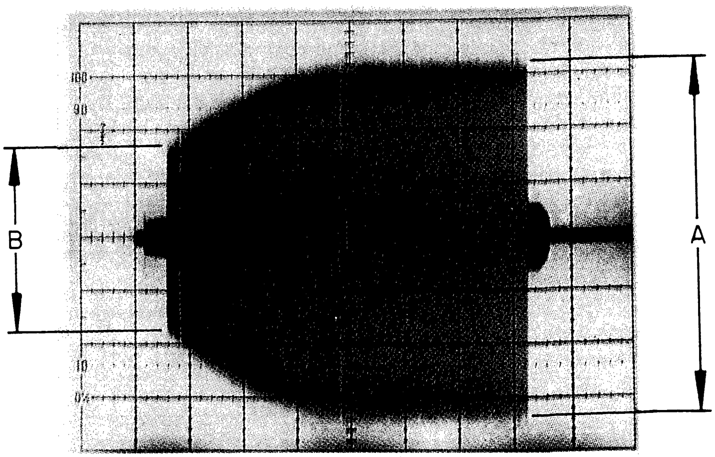


Photo 6 – 2

Défaut sur le côté sortie

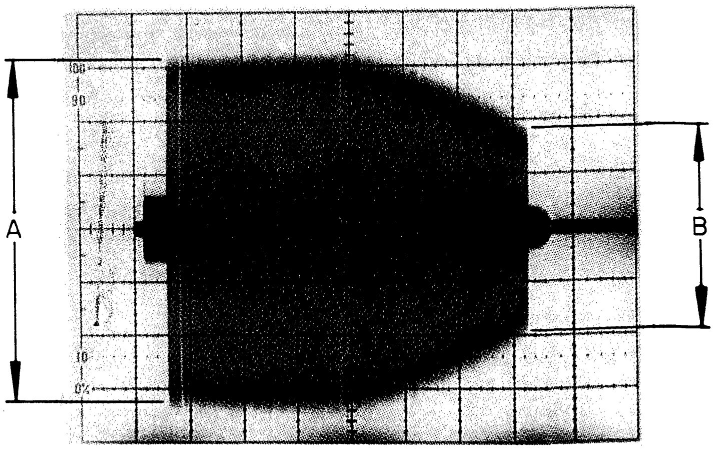


Photo 6 – 3

3. Réglage du passage de bande

But : Faire correctement défiler la bande le long du bord de tête de l'ensemble de tambour. (Ajustement de défilement de bande)
Symptômes en cas de mauvais ajustement : Le son est interrompu, des parasites sont produits ou la qualité sonore est réduite.

Gabarit/instrument de mesure	Section de connexion : d'instrument de mesure	Etat DAT	Section à ajuster
● Oscilloscope ● Bande d'essai Bande d'alignement : SDA-101 (TY-7251) ● Tournevis à axe : R-1784 ● Tournevis Phillips 0 bit ● Poids de cassette DAT : R-2606	● Oscilloscope Dans l'unité RF, CH1 : Entre EQOUT (TP201) et boîtier de blindage HF Dans l'unité principale, CH2 : Entre DREF (CN19-2) et DGND (CN19-1)	● Mode de reproduction	● Guide de galet (côté entrée, côté sortie) ● Guide de tirage

Procédure de réglage

3.1 Ajustement grossier de chaque guide

1. Après avoir fait tourner les guides de galet dans le sens des aiguilles d'une montre sur les côtés entrée et sortie (en utilisant le tournevis à axe (R-1784)) jusqu'à ce que les guides touchent légèrement l'extrémité, les faire tourner dans la direction inverse d'un tour environ.
2. Faire tourner le flasque de guide jusqu'au point auquel la face supérieure du flasque de guide de l'ensemble bras de tirage correspond à l'extrémité supérieure de l'arbre de bras de tirage. (Voir Figure 6-7.)

3.2 Ajustement fin de la hauteur de guide de galet

Préparation

- Monter la bande d'alignement (SDA-101). (Fixer le poids de cassette sur la bande.)
- Après avoir réglé le mode d'essai TP 1,5, régler la forme d'onde 2/3 et reproduire la bande. (Voir page 49.)
- Confirmer que le trou RECG3 de la bande d'essai est ouvert. (Voir Figure 6-8.)

[Ajustement côté sortie]

1. Vérifier la forme d'onde RF. Photo 6-7, serrer le guide de galet sur le côté sortie (environ 1/8 tour). Photo 6-9, desserrer le guide de galet sur le côté sortie (environ 1/8 tour).

[Ajustement côté entrée]

2. Vérifier la forme d'onde RF. Photo 6-6, serrer le guide de galet sur le côté entrée (environ 1/4 tour). Photo 6-8, desserrer le guide de galet sur le côté entrée (environ 1/4 tour).
3. Observer la forme d'onde RF et répéter les étapes 1 et 2 jusqu'à ce que la forme d'onde RF corresponde à la Photo 6-5.
4. Appuyer sur la touche d'ouverture/fermeture (OPEN/CLOSE) pour éjecter la bande et effectuer de nouveau la procédure de confirmation de passage de bande (page 52).

Diagramme de réglage

- Les connexions de l'oscilloscope, etc. sont les mêmes que dans la section 2, Confirmation du passage de bande (page 52).

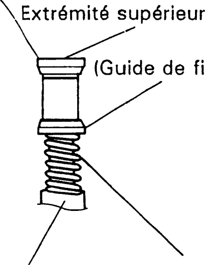
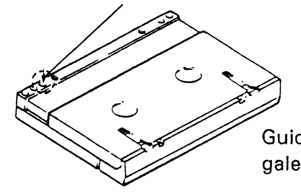

Face supérieure du flasque de guide
Extrémité supérieure de l'arbre
(Guide de fixation)
(Ressort B de réglage de hauteur)
Ensemble de bras de tirage

Figure 6-7


Vue arrière de bande cassette

Note :
Confirmer que le trou est ouvert.
(RECG3 : Bande TP 1,5)

Figure 6-8

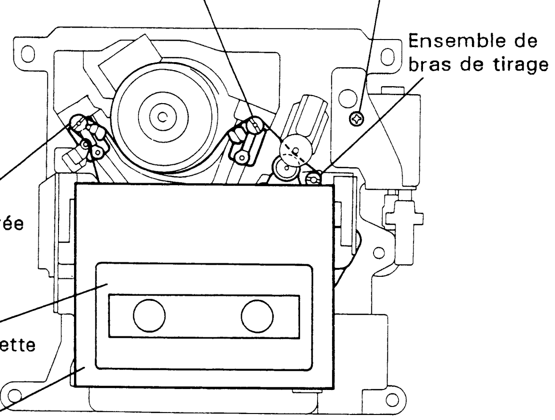

Vis de fixation de support de moteur
Guide de galet côté sortie
Ensemble de bras de tirage
Guide de galet côté entrée
Bande cassette
Poids de cassette

Figure 6-9

Forme d'onde

- Gamme de l'oscilloscope :
  50 mV/div, 1 mS/div

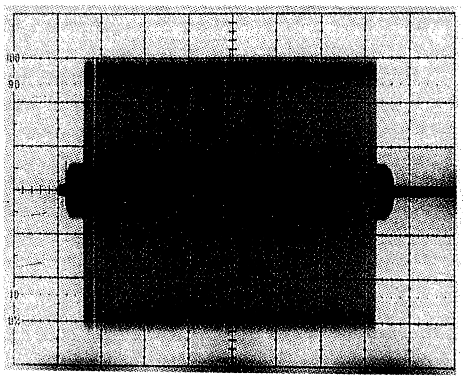


Photo 6 – 4 Niveau maximum de sortie RF

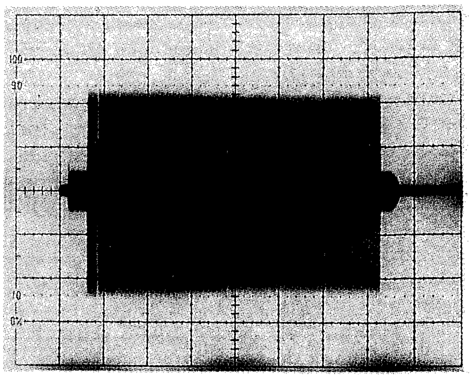


Photo 6 – 5 Niveau de sortie RF 2/3 (ajustement terminé)

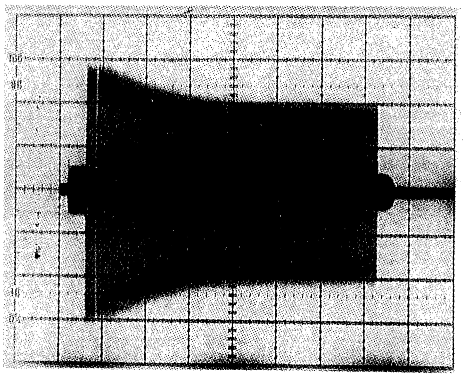


Photo 6 – 6 Galet de guide côté entrée trop relevé

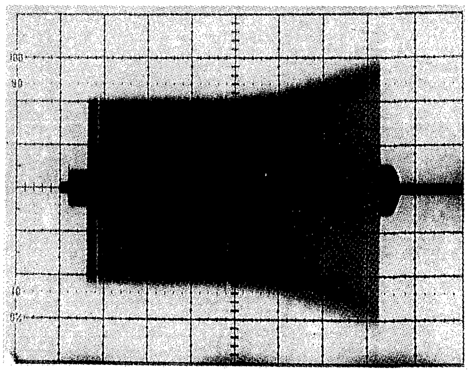


Photo 6 – 7 Galet de guide côté sortie trop relevé

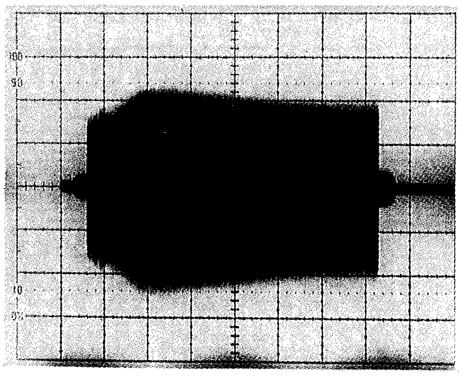


Photo 6 – 8 Galet de guide côté entrée trop baissé

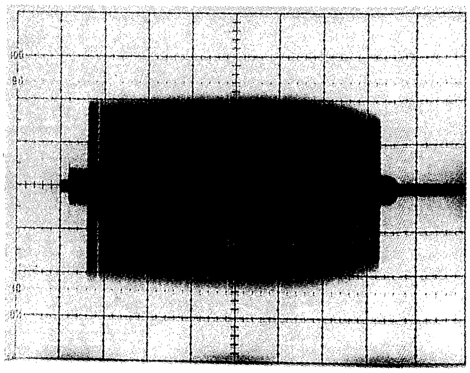


Photo 6 – 9 Galet de guide côté sortie trop baissé

3.3 Ajustement fin de guide de tirage

1. Reproduire la bande et régler le mode CUE en appuyant de manière continue sur la touche FF/CUE lorsque la bande commence à s'enrouler. Observer la torsion de la bande entre le galet-presseur et le guide de tirage en voyant l'image de la tête de la vis fixant le support de moteur réfléchie sur la surface magnétique de la bande. La relation entre l'image réfléchie de la tête de vis et la hauteur du flasque du guide de tirage est indiquée dans la Figure 6-10.
2. Serrer lentement de 180° le flasque du guide de tirage à partir de la position où a été effectué l'ajustement grossier. Confirmer que l'image réfléchie change de c à a au cours du serrage.
3. Au contraire, desserrer de 180° le flasque du guide de tirage et confirmer que l'image réfléchie change de a à c au cours du desserrage.
4. Serrer le flasque du guide de tirage à la condition b dans laquelle le bord supérieur de la bande ondule légèrement, puis le desserrer de 90°.
5. Garder la touche REW/REV enfoncée pour régler le mode REW et confirmer que la bande n'ondule pas aux sections A et B de la Figure 6-11.
6. Après avoir confirmé qu'aucune torsion n'apparaît sur la bande dans la section C de la Figure 6-12, vérifier la présence de torsion et de saillie (forme convexe) dans la section D. (Normalement, la saillie est égale ou inférieure à 0,5 mm).
7. Après avoir appuyé sur la touche d'ouverture/fermeture (OPEN/CLOSE) pour éjecter la bande, reproduire de nouveau la bande, garder la touche FF/CUE enfoncée et observer de nouveau l'image réfléchie de la tête de vis pour confirmer qu'elle est dans la condition c.
8. Garder la touche REW/REV enfoncée et confirmer que l'ondulation et la torsion aux sections A à D sont les mêmes.
9. Appliquer une colle de blocage à la vis située sur la face supérieure du flasque de guide de tirage et bloquer la vis.

Diagramme de réglage

L'image de la vis apparaît sur la bande lorsque la vis réfléchit la lumière.

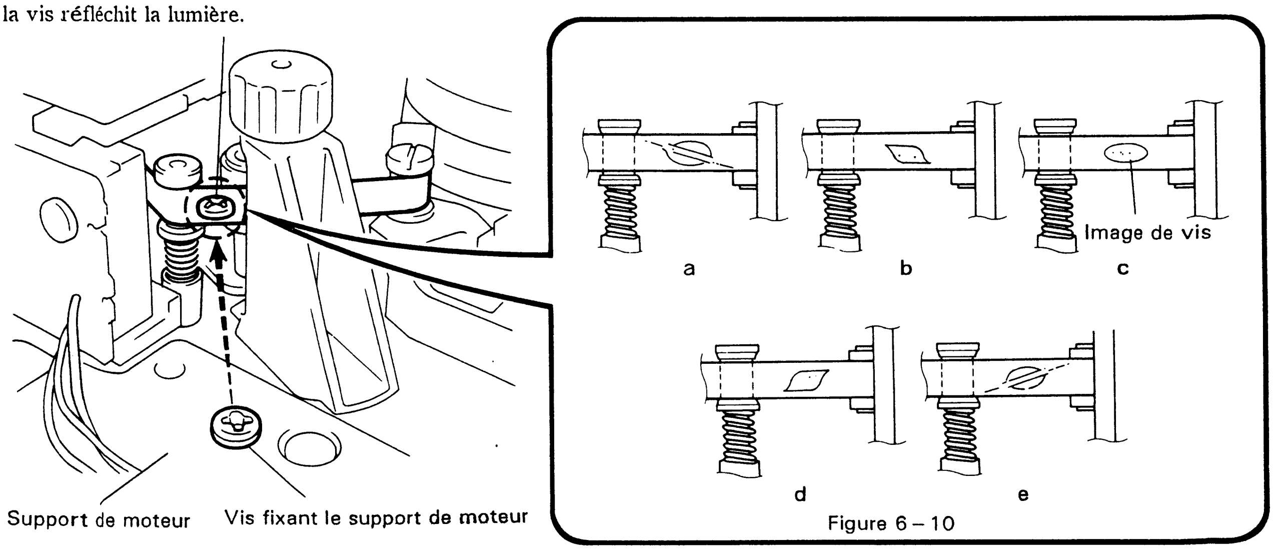


Image de vis
a
b
c
d
e
Support de moteur
Vis fixant le support de moteur

Figure 6 - 10

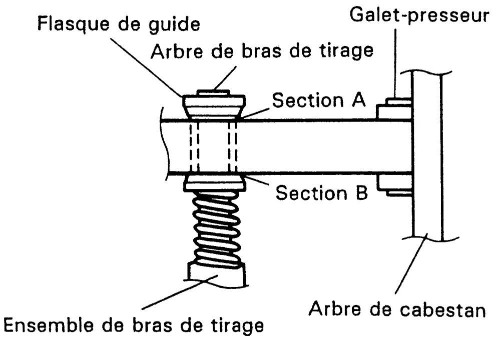

Flasque de guide
Galet-presseur
Arbre de bras de tirage
Section A
Section B
Ensemble de bras de tirage
Arbre de cabestan

Figure 6 - 11

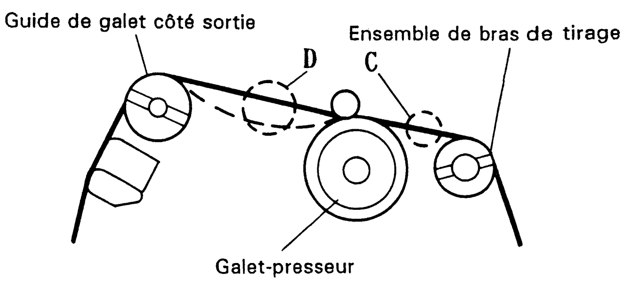

Guide de galet côté sortie
Ensemble de bras de tirage
D
C
Galet-presseur

Figure 6 - 12

6.2 Réglage de la section de système électrique

1. Réglage du courant d'enregistrement ATF

But : Régler le courant d'enregistrement optimum.
Symptômes en cas de mauvais ajustement : Son interrompu (l'alignement ne peut pas être assorti), parasites.

Gabarit/instrument de mesure	Sectionde connexion d'instrument de mesure	Etat DAT	Section à ajuster
• Oscilloscope • Bande d'essai Bande d'essai de niveau : SDA-102 (TY-7111) Bande vierge : SDA-302 *Note :* *Utiliser une partie inutilisée dans laquelle le signal RF n'est pas enregistré.*	• Oscilloscope Dans l'unité principale, CH1 : Entre PLENV (CN19-3) et DGND (CN19-1) CH2 : Entre DREF (CN19-2) et DGND (CN19-1)	• Mode de reproduction et d'enregistrement	• Dans unité RF VR203 (tête A) VR204 (tête B)

Procédure de réglage

Préparation

- Régler le mode d'essai pour le réglage du courant d'enregistrement. (Voir page 49.)

1. Reproduire la bande d'essai de niveau (SDA-102), mesurer et enregistrer la tension aux sections a et b de la forme d'onde dans la Photo 6-10.
2. Confirmer que la bande vierge (SDA-302) est inutilisée ou possède une portion inutilisée. Appuyer sur la touche d'enregistrement (REC), puis sur la touche de pause pour que le signal en provenance de l'émetteur intégral de la machine soit enregistré pendant 30 à 60 secondes.
3. Après l'arrêt de l'enregistrement, rembobiner la partie enregistrée à l'étape 2 et confirmer que les niveaux des formes d'onde reproduites se trouvent dans la gamme de +25% et −20% des niveaux a et b enregistrés à l'étape 1. (Voir Photo 6-11.)
4. Si les niveaux sont hors de la gamme de l'étape 3, faire légèrement tourner VR203 pour la tête A et VR204 pour la tête B, et enregistrer de nouveau le signal sur la partie inutilisée de la bande vierge. Exécuter ensuite l'étape 3.
5. Répéter les étapes 3 et 4 jusqu'à ce que les niveaux se trouvent dans la gamme spécifiée à l'étape 3.

Diagramme de réglage

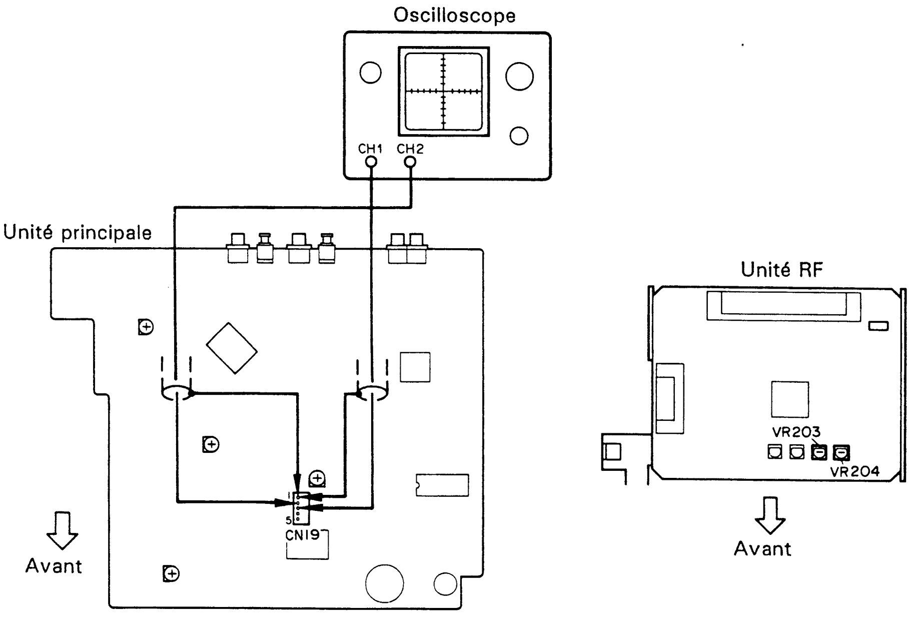


Figure 6 – 13

Forme d'onde

Gamme de l'oscilloscope
CH1 : 0,5 V/div, 2,5 mS/div
CH2 : 5 V/div

Pendant reproduction de bande de niveau (SDA-102)

CH1
CN19-3
PLENV ①

CH2
CN19-2
DREF ②

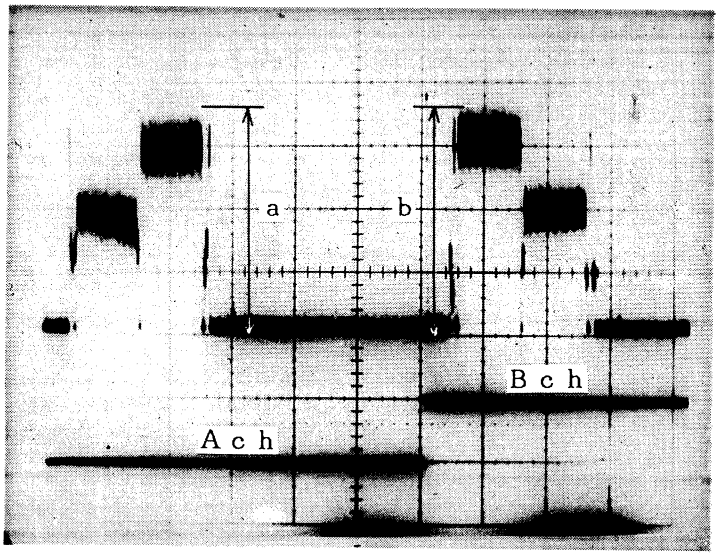


Photo 6 – 10

Pendant reproduction de bande vierge auto-enregistrée

CH1
CN19-3
PLENV ①

CH2
CN19-2
DREF ②

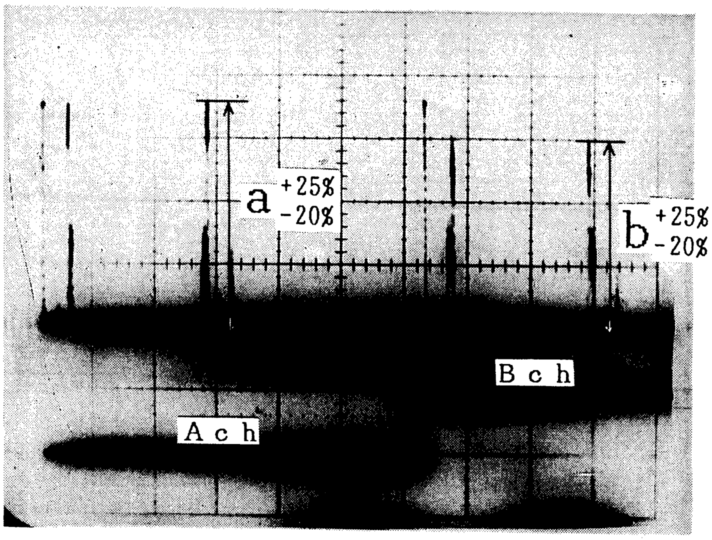


Photo 6 – 11

2. Réglage du compte-tours

But : Faire correspondre la position d'enregistrement au format de bande.
Symptômes en cas de mauvais ajustement : Le son de la bande enregistrée avec une autre machine est interrompu (pas de problème avec l'enregistrement automatique) ou les parasites sont augmentés pour mettre en sourdine le son enregistré.

Gabarit/instrument de mesure	Section de connexion d'instrument de mesure	Etat DAT	Section à ajuster
● Oscilloscope ● Bande d'essai Bande d'alignement : SDA-101 (TY-7251)	● Oscilloscope Dans l'unité RF, CH1 : Entre EQOUT (TP201) et boîtier de blindage RF Dans l'unité principale, CH2 : Entre DREF (CN19-2) et DGND (CN19-1)	● Mode de reproduction (mode d'essai)	● Dans unité principale : VR501

Procédure de réglage

Préparation

- Régler le mode d'essai TP 1,5. (Voir page 49.)

1. Ajuster pour que la position de repère de la forme d'onde RF soit de 650 µs ±20 en commençant par le bord arrière de la forme d'onde DREF.

Forme d'onde

- Gamme de l'oscilloscope
  CH1 : 100 mV/div, 0,1 mS/div
  CH2 : 5 V/div (déclencheur)

Diagramme de réglage

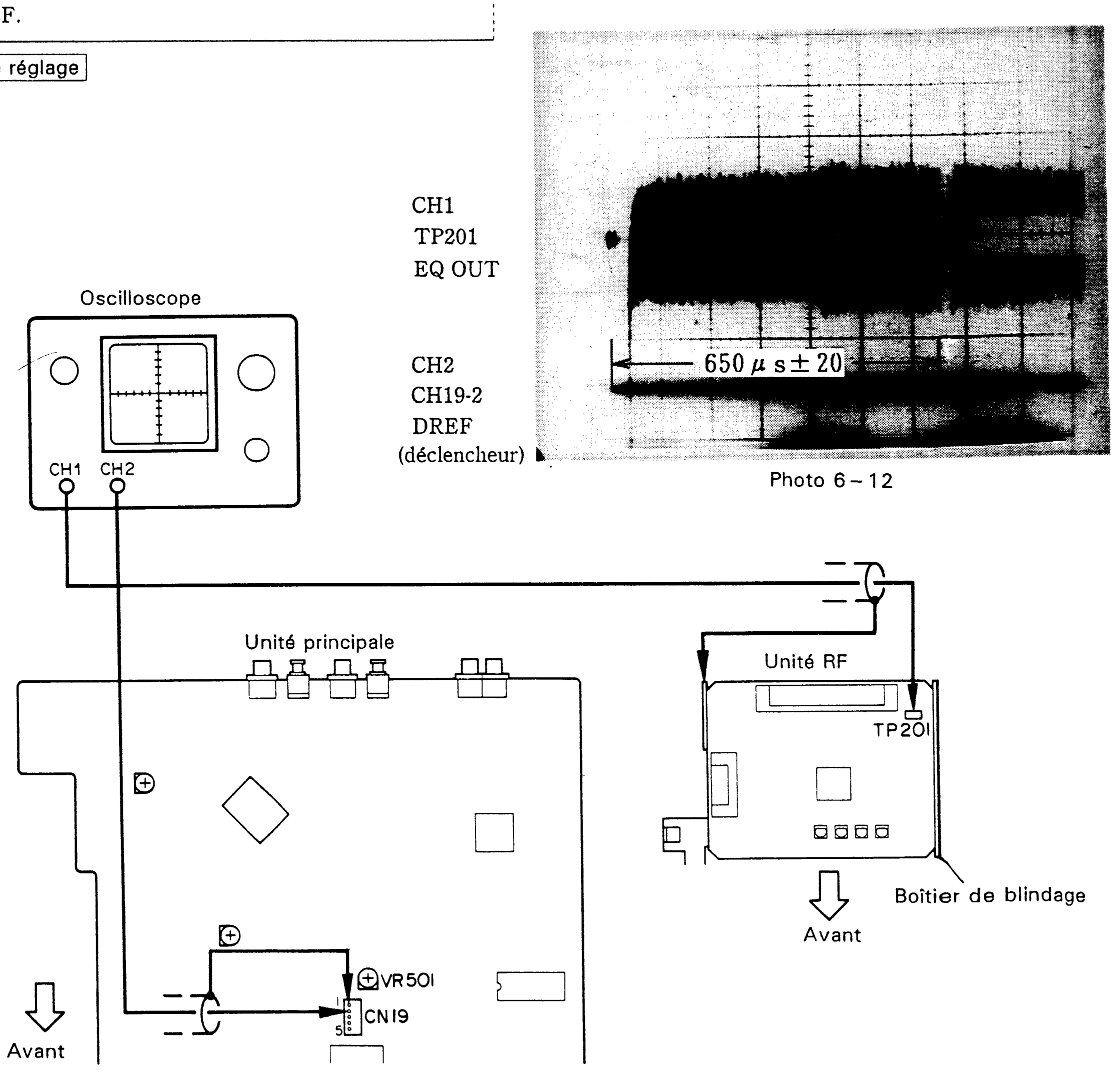

CH1
TP201
EQ OUT
CH2
CH19-2
DREF
(déclencheur)
650 µ s ± 20
Oscilloscope
CH1
CH2
Unité principale
Unité RF
TP201
VR501
CN19
1
5
Avant
Avant
Boîtier de blindage

Photo 6-12

Figure 6-14

3. Réglage du taux d'erreur

But : Reproduire correctement les données.
Symptômes en cas de mauvais ajustement : L'alignement ne correspond pas, une défaillance de défilement se produit, le son est mis en sourdine ou des parasites sont produits.

Gabarit/instrument de mesure	Section de connexion d'instrument de mesure	Etat DAT	Section à ajuster
● Oscilloscope ● Bande vierge : SDA-302	● Oscilloscope Dans l'unité principale, CH1 : Entre SYMN (JP (ERR FLG) ou broche IC501-33) et DGND (CN19-1) CH2 : Entre DREF (CN19-2) et DGND (CN19-1)	● Modes de reproduction et d'enregistrement	● Dans Unité principale : VR504

Procédure de réglage

Préparation

- Enregistrer respectivement pendant 15 secondes un signal musical ou un signal d'essai correct sur la bande vierge (SDA-302) dans les modes SP et LP.

1. Reproduire la partie enregistrée et ajuster de manière à ce que le drapeau d'erreur apparaisse le plus (72 crêtes au maximum) sur la forme d'onde de l'oscilloscope de la manière indiquée dans la Photo 6-13.

Forme d'onde

- Gamme de l'oscilloscope :
  CH1 : 5 V/div, 2,5 mS/div
  CH2 :

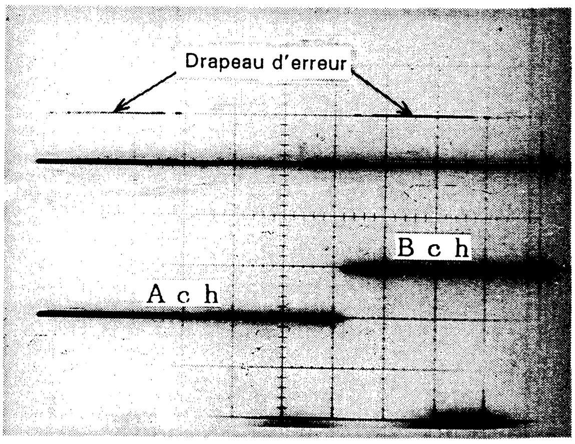
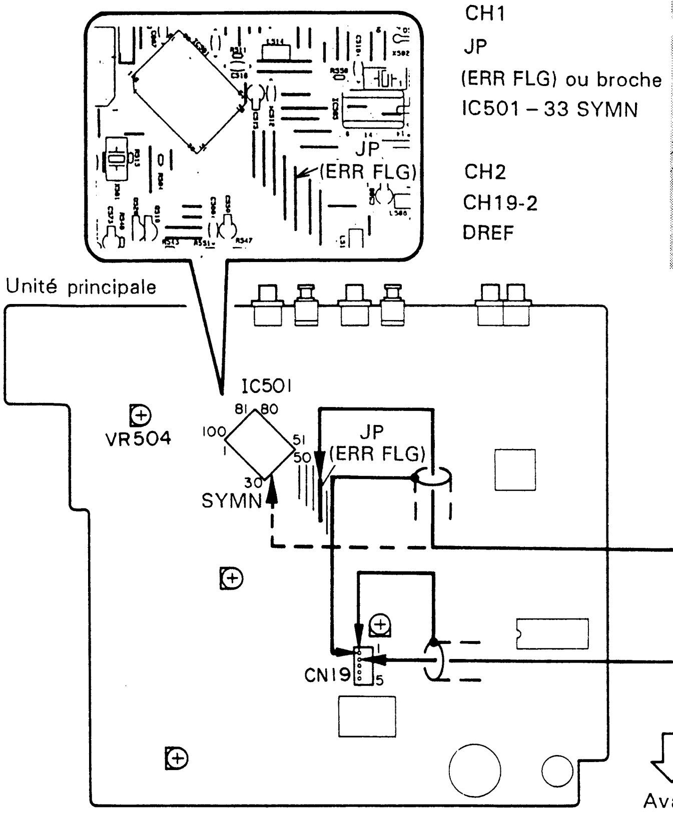


Photo 6-13

Diagramme de réglage


CH1
JP
(ERR FLG) ou broche
IC501-33 SYMN
CH2
CH19-2
DREF
JP
(ERR FLG)
Unité principale
IC501
81
80
100
1
51
50
30
SYMN
VR504
JP
(ERR FLG)
CN19
1
5
Avant

Oscilloscope

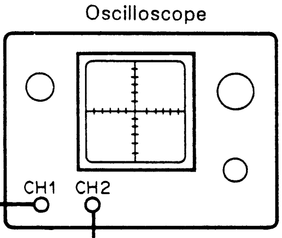


Figure 6-15

Forme d'onde

- Gamme de l'oscilloscope
  CH1 : 5 V/div, 1 mS/div

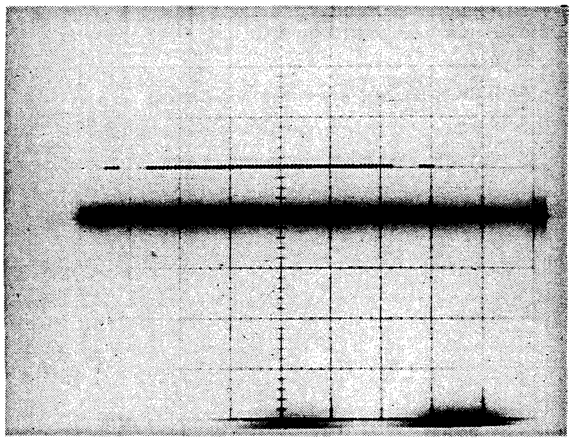


Photo 6 – 14

[Très bon]

- Taux d'erreur 1 × 10^{-4}
  CH1 : SYMN (JP (ERR FLG) ou broche IC501 – 33)

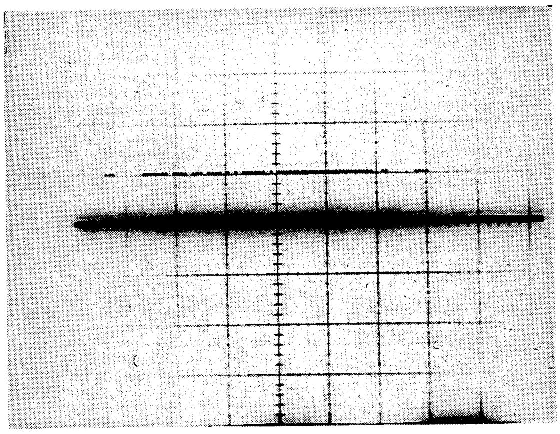


Photo 6 – 15

[L'erreur est corrigée et le son est normal]

- Taux d'erreur 1 × 10^{-2}
  CH1 : SYMN (JP (ERR FLG) ou broche IC501 – 33)

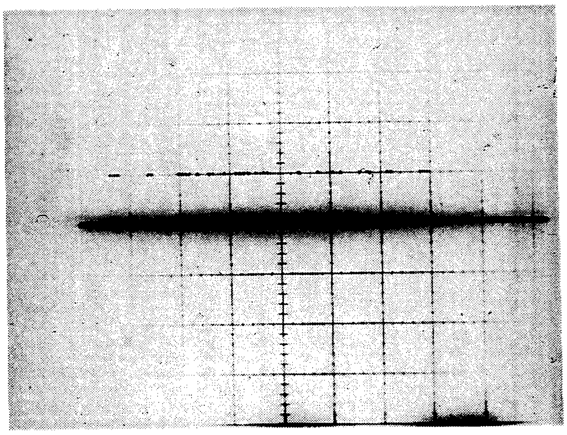


Photo 6 – 16

[Le signal sonore est interpolé et anormal lorsqu'écouté avec soin]

- Taux d'erreur 1 × 10^{-1}
  CH1 : SYMN (JP (ERR FLG) ou broche IC501 – 33)

6. AJUSTE

Antes de realizar el ajuste, asegúrese de que :

1. Las superficies de funcionamiento de la cabeza y la cinta (guía de la cinta, corona, eje del cabrestante, rodillo de presión) estén limpias.
2. El aparato se haya calentado durante varios minutos.
3. El nivel de señales sea de 0 dBv = 1 Vrms.
4. Se haya conectado una resistencia de carga de 10 kohmios en el terminal de salida de línea del sistema de audio.
5. La sonda del osciloscópio sea 10 :1

Cinta de prueba

Cinta de seguimiento :	SDA-101 (TY-7251)
Cinta de nivel :	SDA-102 (TY-7111)
Medidor de torsión FWD :	SDA-104 (TW-7131)
Cinta en blanco :	SDA-302

Ajustes

● Sección del sistema mecánico

1. Ajuste de torsión de la tensión posterior
2. Confirmación de paso de cinta
3. Ajuste de paso de cinta

● Sección del sistema eléctrico

1. Ajuste de la corriente de grabación ATF
2. Ajuste TACH
3. Ajuste de proporción de errores

Cómo introducir los modos de prueba

(1) Modo de prueba 1.5 TP

1. Ajuste el interruptor TIMER en posición PLAY.
2. Presione la tecla RESET del contador mientras presiona la tecla MUTE.
3. En este momento, confirme que el visualizador del contador muestra "ADJ."

   Para cancelar este modo de prueba, ajuste el interruptor TIMER a la posición OFF o presione la tecla CHECK.

Ajuste de forma de onda de 2/3

1. Active el modo de prueba 1.5 TP.
2. Ajuste el interruptor INPUT SELECTOR en posición ANALOG. (Dirección de avance, forma de onda de 2/3)
3. Compruebe la forma de onda reproducida. Si el seguimiento no se corresponde o no es estable, utilice la tecla MS + (más) y la tecla − (menos) para buscar el punto en que el seguimiento sea estable.

   Si el seguimiento empeora durante la búsqueda (en comparación con la condición inicial), presione la tecla PEAK RESET y vuelva a ajustar el seguimiento usando las teclas MS + y −.

(2) Modo de prueba de ajuste de la corriente de grabación

1. Ajuste el interruptor TIMER a la posición PLAY.
2. Ajuste el INPUT SELECTOR a la posición ANALOG.
3. Presione la tecla MODE mientras mantiene presionada la tecla MUTE.
4. Confirme que la visualización P-NO del tubo FL muestre "db."

   Para cancelar el modo de prueba, presione la tecla CHECK.

Preparaciones para antes del ajuste

1. Extraiga la cubierta.
2. Extraiga la unidad de instalación del casete y la unidad mecánica de DAT. (Vea la sección sobre la extracción de la unidad mecánica de DAT en la página 11.) En este momento, no desconecte el PCB flexible que sale de la unidad mecánica de DAT de su conector y apriete un tornillo de la caja de protección para fijar la unidad mecánica de DAT como se muestra en la figura 6 – 1. Las partes mecánicas podrán ajustarse ahora.

Nota :
Cuando vuelva a instalar la unidad de instalación del casete, después de montar la unidad mientras la puerta de entrada del casete del panel frontal está abierta, apriete los cinco tornillos. Confirme que la puerta se abre y cierra con suavidad moviendo el brazo acoplado en la unidad hacia arriba y hacia abajo. (Vea la figura 6 – 2.)

● Preparación para la inspección de la unidad principal

1. Afloje y extraiga el anillo de resorte del eje del control, y tire hacia afuera del eje.
2. Extraiga el cable plano de los tres conectores, afloje y extraiga los nueve tornillos del panel posterior y un tornillo del soporte del control y extraiga el panel posterior.
3. Afloje y extraiga los nueve tornillos que fijan la unidad principal y sujete el tablero de la unidad principal como se muestra en la figura 6 – 3.

Nota :
- *Para la grabación analógica, extraiga la unidad VR principal del panel posterior y conecte el cable plano desde la unidad VR principal a CN15. Para utilizar el VR de balance o auriculares, conecte el cable a CN16 ó CN14, respectivamente.*
- *Para operar esta unidad con la unidad MAIN en posición recta, conecte los puntos de tierra ①, ② y ③, mostrados en la figura de abajo, al chasis. Para emplear la unidad VR principal, conecte también el punto de tierra ④ al chasis.*

Nota para el montaje :
Instale primero la unidad VR principal en el panel posterior, después instale el panel posterior en el chasis.

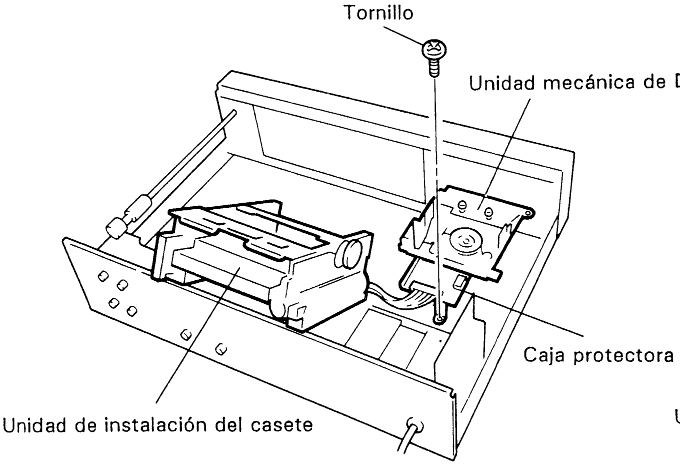

Tornillo
Unidad mecánica de DAT
Caja protectora
Unidad de instalación del casete

Figura 6 – 1

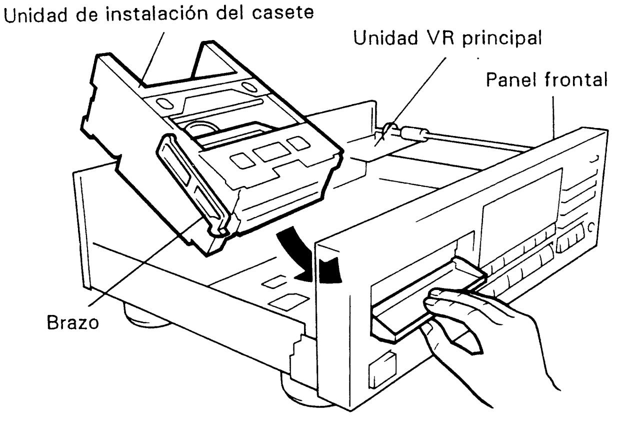

Unidad de instalación del casete
Unidad VR principal
Panel frontal
Brazo

Figura 6 – 2

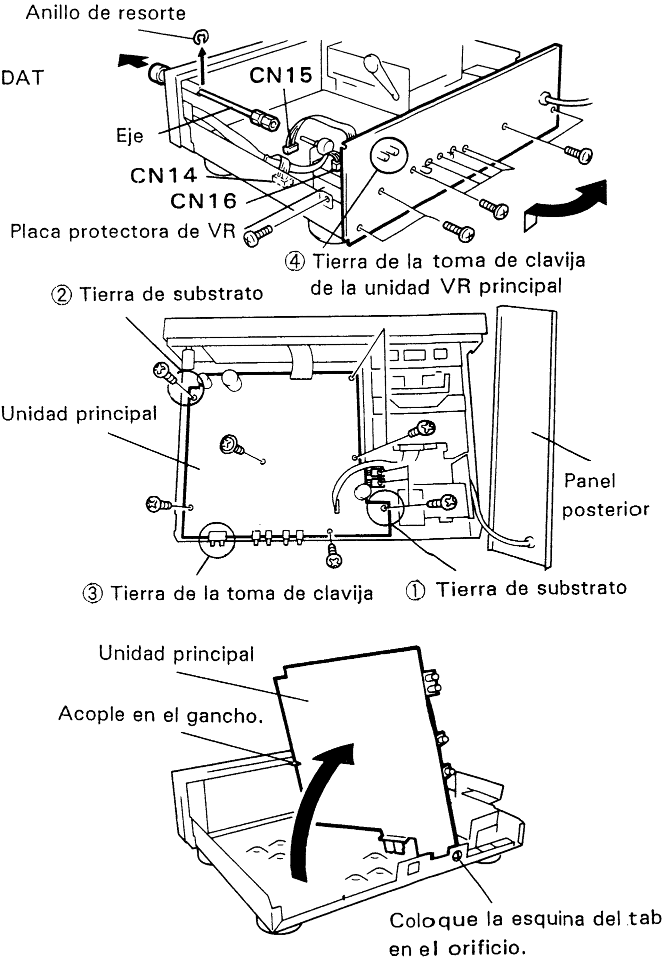

Anillo de resorte
CN15
Eje
CN14
CN16
Placa protectora de VR
④ Tierra de la toma de clavija de la unidad VR principal
② Tierra de substrato
Unidad principal
Panel posterior
③ Tierra de la toma de clavija
① Tierra de substrato
Unidad principal
Acople en el gancho.
Coloque la esquina del tablei en el orificio.

Figura 6 – 3

6.1 Ajuste de la sección del sistema mecánico

1. Ajuste de la torsión de la tensión posterior

Propuesta : Estabilizar el contacto de la cinta con la corona giratoria.
Síntomas en casos de ajuste incorrecto : Torsión pequeña → El funcionamiento de la cinta es inestable.
Torsión grande → La cinta o la cabeza está dañadas.

Instrumento/plantill de medición	Sección de conexión del instrumento de medición	Estado de DAT	Sección a ser ajustada
● Medidor de torsión FWD : SDA-104 (TW-7131) ● Contrapeso del casete DAT : R-2606		● Modo PLAY	● Parte de enganche del resorte de la base del carrete

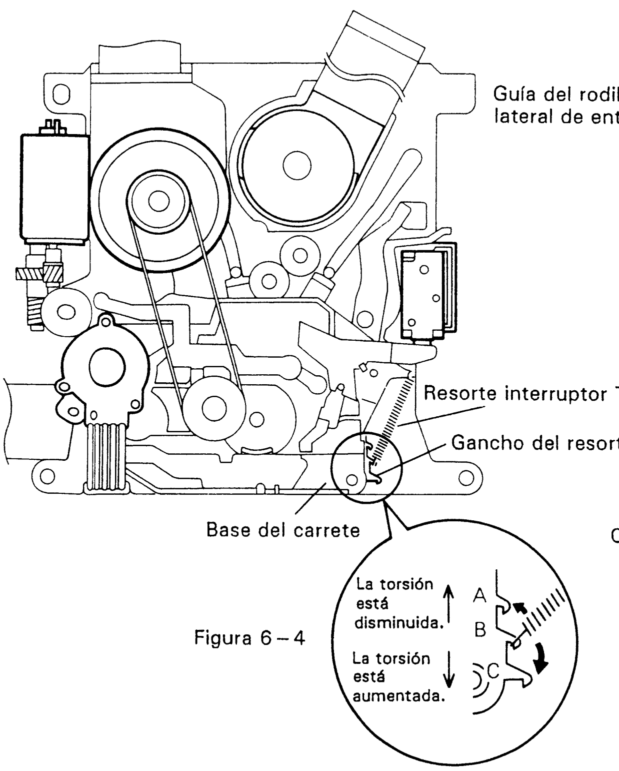
Procedimiento de ajuste

Preparación

- Monte el medidor de torsión FWD (SDA-104). (En este momento, acople el contrapeso de casete para evitar que la cinta se mueva hacia arriba.)

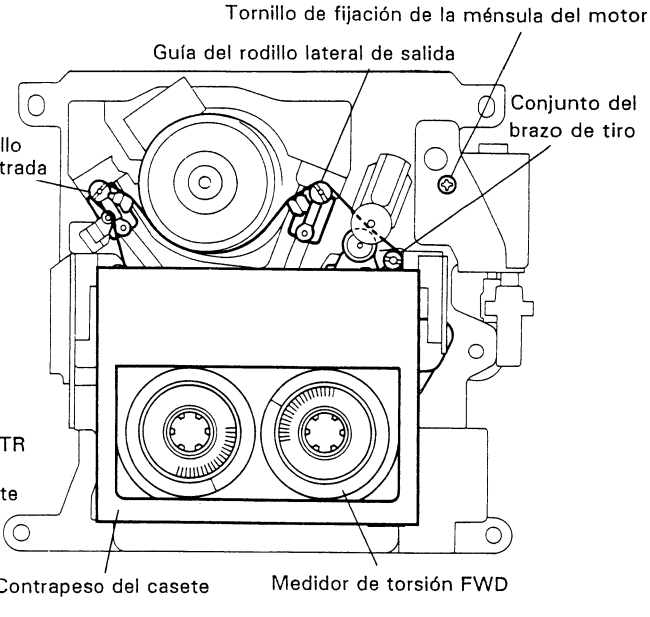
1. Presione la tecla PLAY y confirme que el valor central de la torsión de tensión posterior es de 6,5 a 9,5 g•cm. Si el valor está fuera del especificado, ajuste las posiciones A a C de la parte de enganche del resorte de la base del carrete.

Diagrama de ajuste



Resorte interruptor TR
Gancho del resorte
Base del carrete
La torsión está disminuida.
A
B
La torsión está aumentada.
C

Figura 6 – 4



Tornillo de fijación de la ménsula del motor
Guía del rodillo lateral de salida
Conjunto del brazo de tiro
Guía del rodillo lateral de entrada
Contrapeso del casete
Medidor de torsión FWD

Figura 6 – 5

2. Confirmación de paso de la cinta

Propuesta : Para confirmar que la cinta funciona correctamente a lo largo del borde delantero del conjunto de la corona.
(ajuste del funcionamiento de la cinta)
Síntomas en casos de ajuste incorrecto : El sonido se interrumpe, se genera ruido o la calidad del sonido disminuye.

Instrumento/plantilla de medición	Sección de conexión del instrumento de medición	Estado de DAT	Sección a ser ajustada
● Osciloscópio ● Cinta de prueba Cinta de seguimiento : SDA-101 (TY-7251) ● Contrapeso del casete DAT : R-2606	● Osciloscópio En la unidad RF, CH1 : Entre EQOUT (TP201) y la caja protectora de RF En la unidad principal, CH2 : Entre DREF (CN19-2) y DGND (CN19-1)	● Modo PLAY (modo de prueba)	● Comprobación de forma de onda

Procedimiento de ajuste

Preparación

- Monte la cinta de seguimiento (SDA-101). (En este momento, acople el contrapeso del casete en la cinta.)
- Después de ajustar el modo de prueba 1.5 TP, ajuste la forma de onda de 2/3 y reproduzca la cinta. (Vea la página 62.)

1. Compruebe la forma de onda usando el osciloscópio y confirme que la planeidad es de 75% o más. (En este momento, reproduzca la cinta después de confirmar que el orificio RECG3 de la cinta de prueba está abierto.)
2. Si la planeidad es menor del 75% en este momento, ejecute el ajuste de paso de la cinta (página 67).

- Planeidad = B/A × 100 (%)

Diagrama de ajuste

Nota :
Confirme que el orificio está abierto.
(RECG3 : Cinta 1.5 TP)

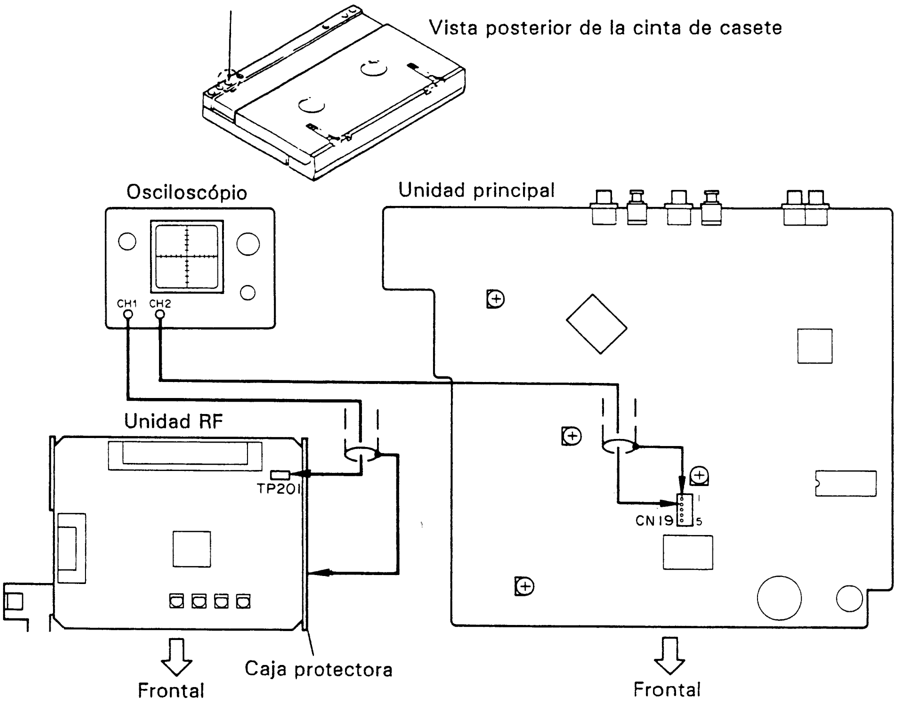


Figura 6-6

Forma de onda

- Margen del osciloscópio :
  50 mV/div. 1 mS/div

Normal

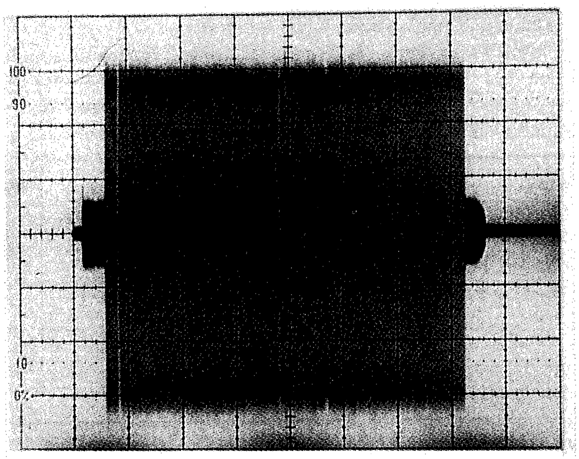


Foto 6 – 1

Fallo en el lado de entrada

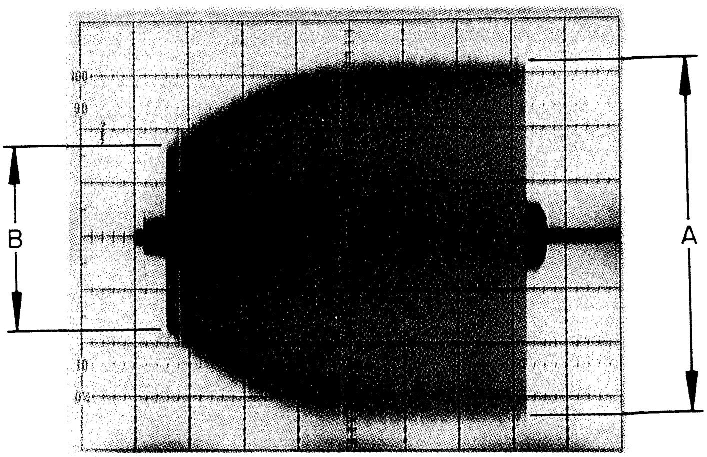


Foto 6 – 2

Fallo en el lado de salida

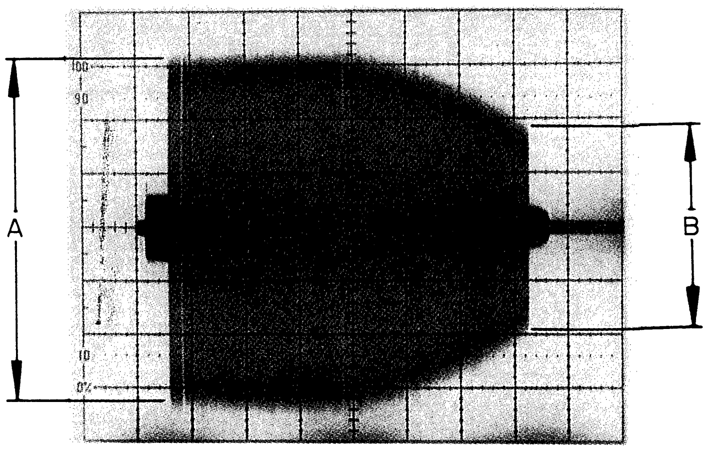


Foto 6 – 3

3. Ajuste de paso de la cinta

Propuesta : Hacer que la cinta funcione correctamente a lo largo del borde delantero del conjunto de la corona.
(ajuste del funcionamiento de la cinta)
Síntomas en caso de ajuste incorrecto : El sonido se interrumpe, se genera ruido o la calidad de sonido disminuye.

Instrumento/plantilla de medición	Sección de conexión del instrumento de medición	Estado de DAT	Sección a ser ajustada
● Osciloscópio ● Cinta de prueba Cinta de seguimiento : SDA-101 (TY-7251) ● Destornillador de pasadores : R-1784 ● Destornillador Phillips de broca 0 ● Contrapeso del casete DAT: R-2606	● Osciloscópio En la unidad RF, CH1 : Entre EQOUT (TP201) y la caja protectora de RF En la unidad principal, CH2 : Entre DREF (CN19-2) y DGND (CN19-1)	● Modo PLAY	● Guía del rodillo (lado de entrada, lado de salida) ● Guía de tiro

Procedimiento de ajuste

3.1 Ajuste aproximado de cada guía

1. Después de girar las guías del rodillo en los lados de entrada y salida hacia la derecha (usando el destornillador de pasadores (R-1784) hasta que las guías toquen ligeramente el extremo, gire las guías en dirección invertida una vuelta.
2. Gire la brida de guía hacia el punto donde la superficie superior de la brida de guía del conjunto del brazo de tiro se corresponda con el extremo superior del eje del brazo de tiro. (Vea la figura 6-7.)

3.2 Ajuste preciso de la altura de la guía de rodillo

Preparación

- Monte la cinta de seguimiento (SDA-101). (Acople el contrapeso del casete en la cinta.)
- Después de ajustar el modo de prueba 1.5 TP, ajuste la forma de onda de 2/3 y reproduzca la cinta. (Vea la página 62.)
- Confirme que el orificio de RECG3 de la cinta de prueba está abierto. (Vea la figura 6-8.)

[Ajuste del lado de salida]

1. Compruebe la forma de onda RF. Foto 6-7, apriete la guía del rodillo del lado de salida (1/8 de vuelta). Foto 6-9, afloje la guía de rodillo del lado de salida (1/8 de vuelta).

[Ajuste del lado de entrada]

2. Compruebe la forma de onda RF. Foto 6-6, apriete la guía de rodillo del lado de entrada (1/4 de vuelta). Foto 6-8, afloje la guía de rodillo del lado de entrada (1/4 de vuelta).
3. Observe la forma de onda RF y repita los pasos 1 y 2 hasta que la forma de onda RF se corresponda con la foto 6-5.
4. Presione la tecla OPEN/CLOSE para expulsar la cinta, y ejecute el procedimiento de confirmación de paso de la cinta otra vez (página 65).

Diagrama de ajuste

- Las conexiones del osciloscópio, etc. son igual que en la sección 2 de confirmación de paso de la cinta (página 65).

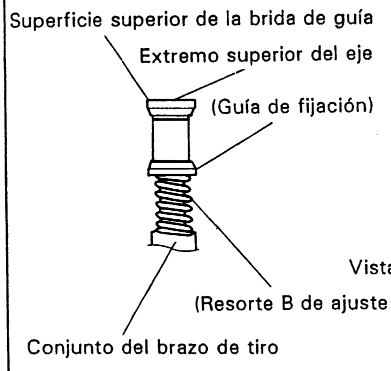

Superficie superior de la brida de guía
Extremo superior del eje
(Guía de fijación)
(Resorte B de ajuste de altura)
Conjunto del brazo de tiro

Figura 6-7

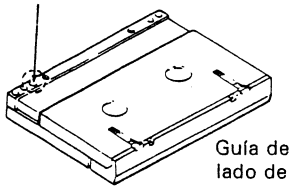

Nota :
Confirme que el orificio está abierto
(RECG3 : cinta 1.5 TP)
Vista posterior de la cinta de casete

Figura 6-8

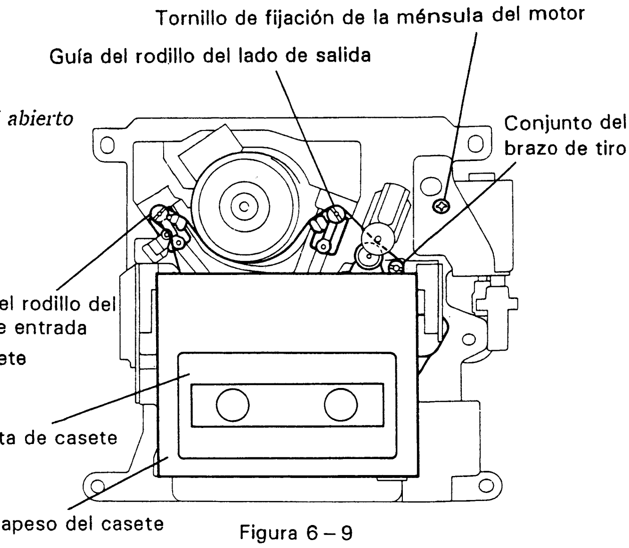

Tornillo de fijación de la ménsula del motor
Guía del rodillo del lado de salida
Conjunto del brazo de tiro
Guía del rodillo del lado de entrada
Cinta de casete
Contrapeso del casete

Figura 6-9

Forma de onda

- Margen del osciloscópio :
  50 mV/div, 1 mS/div

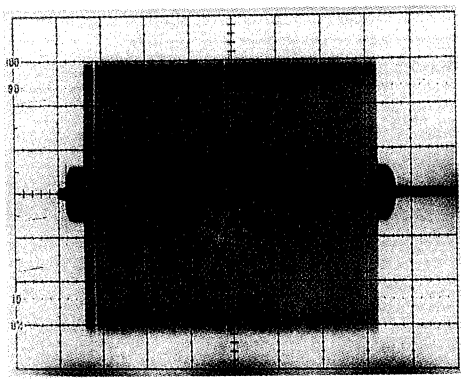


Foto 6 – 4 Nivel de salida máximo de RF

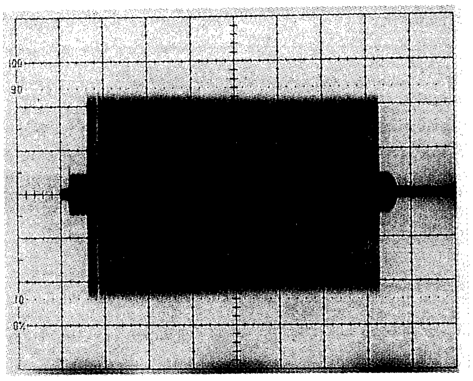


Foto 6 – 5 Nivel de salida de RF de 2/3 (ajuste completo)

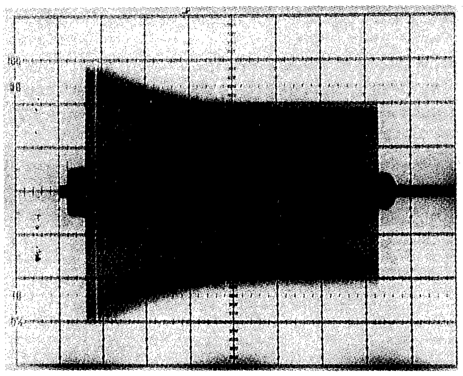


Foto 6 – 6 Rodillo de la guía del lado de entrada demasiado elevado

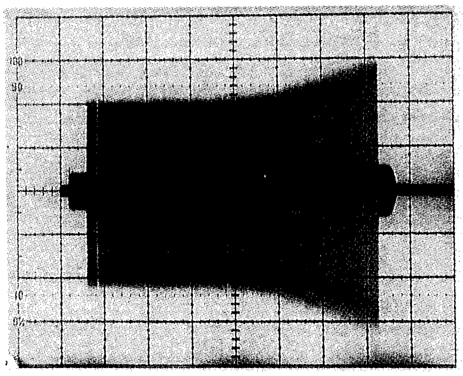


Foto 6 – 7 Rodillo de la guía del lado de salida demasiado elevado

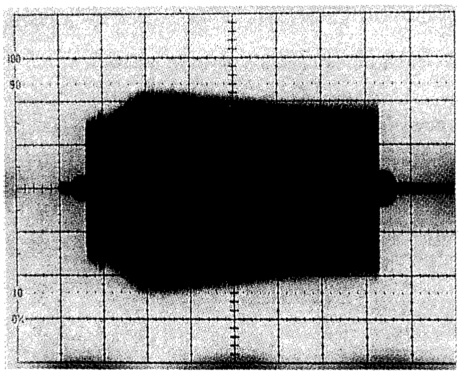


Foto 6 – 8 Rodillo de la guía del lado de entrada demasiado bajado

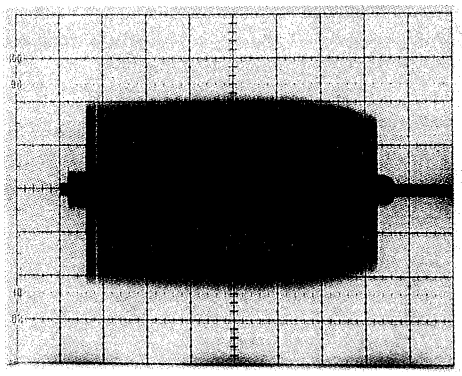


Foto 6 – 9 Rodillo de la guía del lado de salida demasiado bajado

3.3 Ajuste preciso de la guía de tiro

1. Reproduzca la cinta y ajuste el modo CUE presionando continuamente la tecla FF/CUE cuando la cinta empiece a bobinarse. Observe la torsión de la cinta entre el rodillo de presión y la guía de tiro viendo la imagen de la cabeza del tornillo de fijación de la ménsula del motor reflejada en la superficie magnética de la cinta. La relación entre la imagen reflejada de la cabeza del tornillo y altura de la brida de guía de tiro se muestra en la figura 6-10.
2. Apriete ligeramente la brida de la guía de tiro 180 grados desde la posición donde se realizó el procedimiento de ajuste. Confirme que la imagen reflejada cambia de "c" a "a" del proceso de apriete.
3. Por el contrario, afloje labrida de guía de tiro 180 grados y confirme que la imagen reflejada cambia de "a" a "c" del proceso de aflojamiento.
4. Afloje la brida de guía de tiro en la condición "b" en que el borde superior de la cinta se curva ligeramente, y después afloje 90 grados.
5. Mantenga presionada la tecla REW/REV para ajustar el modo REW y confirme que la cinta no se curva en las secciones A y B de la figura 6-11.
6. Después de confirmar que no aparece torsión en la cinta en la sección C de la figura 6-12, compruebe la torsión y combadura (forma convexa) en la sección D. (Normalmente, la combadura es de 0,5 mm o menos.)
7. Después de presionar la tecla OPEN/CLOSE para expulsar la cinta, reproduzca la cinta otra vez, mantenga presionada la tecla FF-/CUE y observe de nuevo la imagen reflejada de la cabeza del tornillo para confirmar que está en condición "c".
8. Mantenga presionada la tecla REW/REV y confirme que la curvatura y torsión en las secciones A a D son iguales.
9. Aplique pegamento de bloqueo en el tornillo de la superficie superior de la brida de guía de tiro y bloquee el tornillo.

Diagrama de ajuste

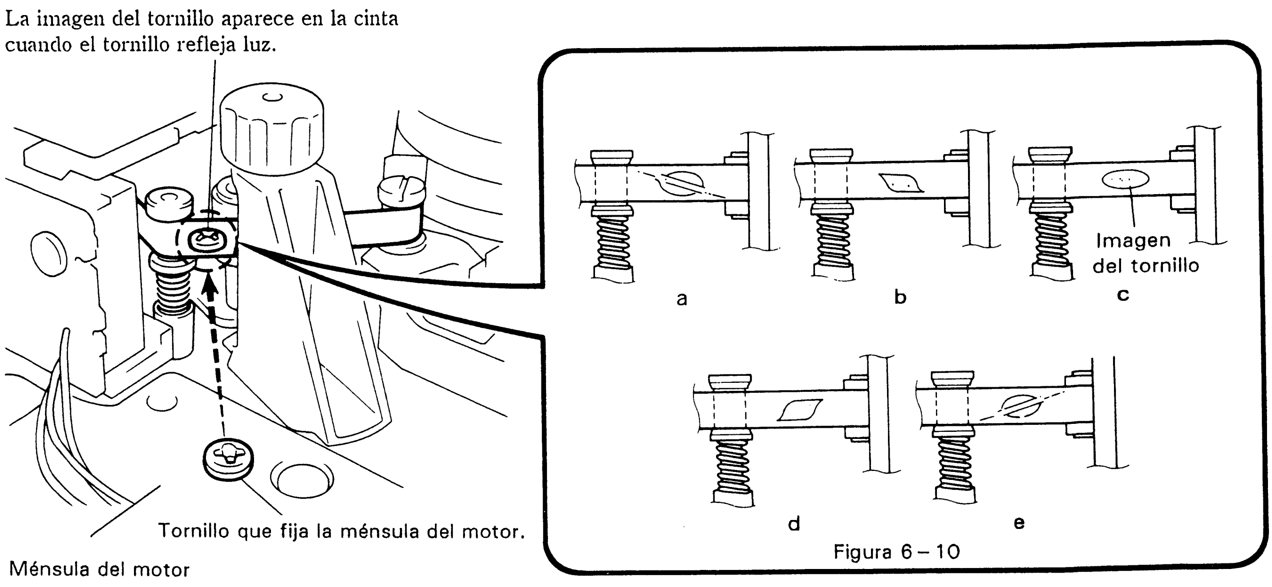

La imagen del tornillo aparece en la cinta cuando el tornillo refleja luz.
Imagen del tornillo
a
b
c
d
e
Tornillo que fija la ménsula del motor.
Ménsula del motor

Figura 6 – 10

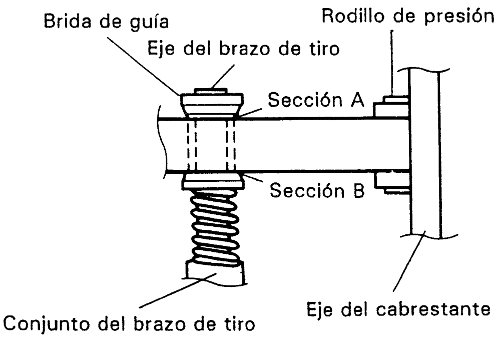

Brida de guía
Rodillo de presión
Eje del brazo de tiro
Sección A
Sección B
Conjunto del brazo de tiro
Eje del cabrestante

Figura 6 – 11

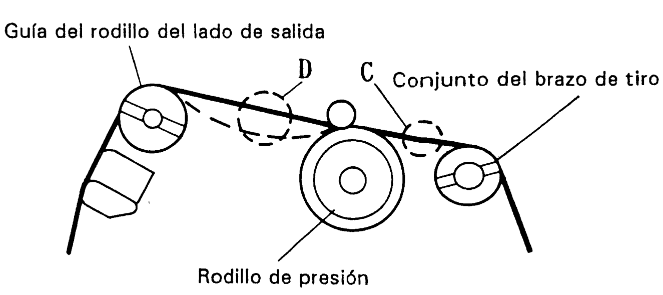

Guía del rodillo del lado de salida
D
C
Conjunto del brazo de tiro
Rodillo de presión

Figura 6 – 12

6.2 Ajuste de la sección del sistema eléctrico

1. Ajuste de la corriente de grabación ATF

Propuesta : Ajustar la corriente de grabación óptima.
Síntomas en casos de ajuste incorrecto : Sonido interrumpido (el seguimiento no puede corresponderse), ruido.

Instrumento/plantilla de medición	Sección de conexión del instrumento de medición	Estado de DAT	Sección a ajustar
● Osciloscópio ● Cinta de prueba Cinta de prueba de nivel : SDA-102 (TY-7111) Cinta en blanco : SDA-302 *Nota :* *Utilice una parte sin utilizar donde la señal RF no esté grabada.*	● Osciloscópio En la unidad principal, CH1 : Entre PLENV (CN19-3) y DGND (CN19-1) CH2 : Entre DREF (CN19-2) y DGND (CN19-1)	● Modos PLAY y REC	● En la unidad RF VR203 (cabeza A) VR204 (cabeza B)

Procedimiento de ajuste

Preparación

- Ajuste el modo de prueba para el ajuste de la corriente de grabación. (Vea la página 62.)

1. Reproduzca la cinta de prueba de nivel (SDA-102), mida y grabe la tensión en las secciones "a" y "b" de la forma de onda de la foto 6-10.
2. Confirme que la cinta en blanco (SDA-302) no se ha usado o tiene una parte sin usar. Presione la tecla REC y después la tecla PAUSE de forma que la señal del transmisor integral de la máquina se grabe durante 30 a 60 segundos.
3. Después de detener la grabación, rebobine la parte grabada en el paso 2 y confirme que los niveles de las formas de onda reproducidas están dentro del margen de + 25% y − 20% de los niveles "a" y "b" grabados en el paso 1. (Vea la foto 6-11.)
4. Si los niveles están fuera del margen del paso 3, gire ligeramente VR203 para la cabeza A y VR204 para la cabeza B y grabe la señal de nuevo en la parte sin usar de la cinta en blanco. Después, ejecute el paso 3.
5. Repita los pasos 3 y 4 hasta que los niveles estén dentro del margen especificado en el paso 3.

Diagrama de ajuste

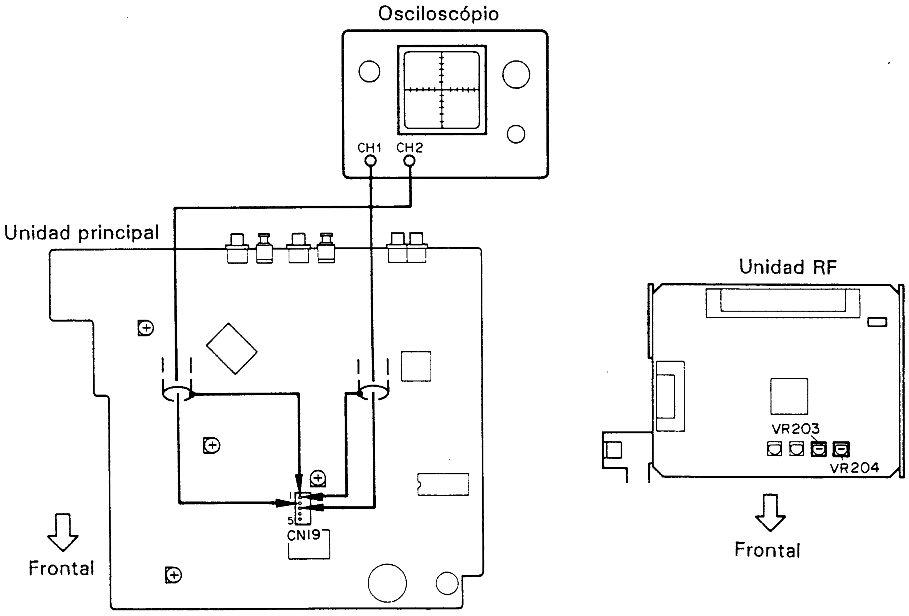


Figura 6 – 13

Forma de onda

Margen del osciloscópio
CH1 : 0,5 V/div, 2,5 mS/div
CH2 : 5 V/div

Durante la reproducción de la cinta de nivel (SDA-102)

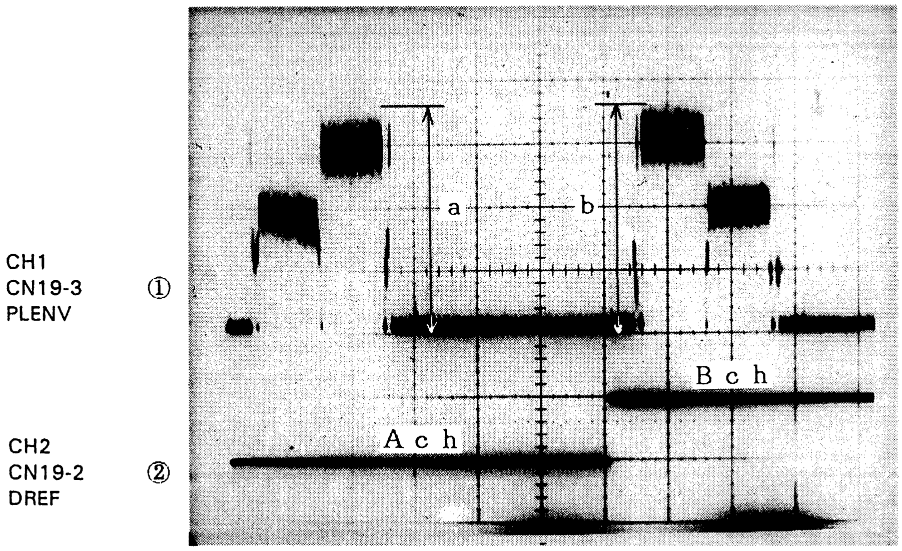


Foto 6 – 10

Durante la reproducción de la cinta en blanco autograbada

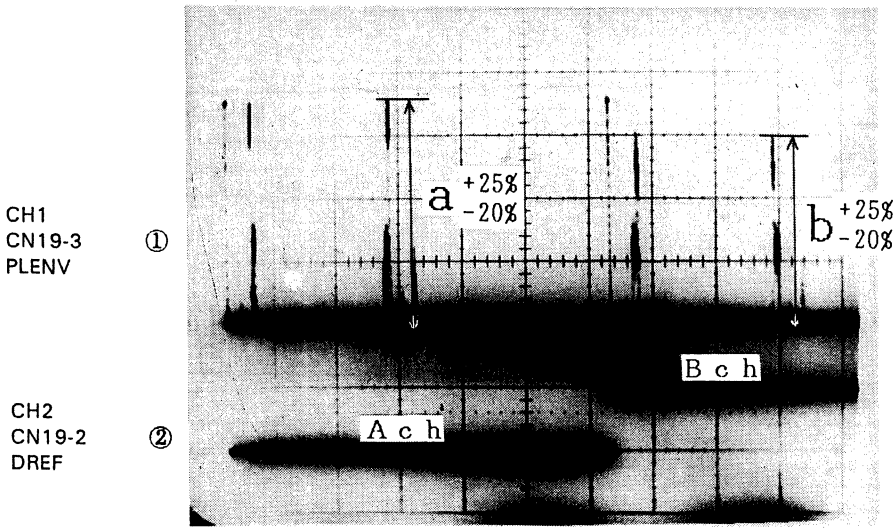


Foto 6 – 11

2. Ajuste de TACH

Propuesta : Corresponder la posición de grabación en el formato de la cinta.
Síntomas en casos de ajuste incorrecto : El sonido de la cinta grabada con otra máquina se interrumpe (no hay problemas con la autograbación) o el ruido aumenta al silenciar el sonido grabado.

Instrumento/plantilla de medición	Sección de conexión del instrumento de medición	Estado de DAT	Sección a ser ajustada
● Osciloscópio ● Cinta de prueba Cinta de seguimiento : SDA-101 (TY-7251)	● Osciloscópio En la unidad RF, CH1 : Entre EQOUT (TP201) y la caja protectora de RF En la unidad principal, CH2 : Entre DREF (CN19-2) y DGND (CN19-1)	● Modo PLAY (modo de prueba)	● En la unidad principal : VR501

Procedimiento de ajuste

Preparación

- Ajuste el modo de prueba 1.5 TP. (Vea la página 62.)

1. Ajuste de forma que la parte del marcador de la forma de onda RF sea de 650 μs ±20 empezando con el borde delantero de la forma de onda DREF.

Forma de onda

- Margen del osciloscópio
  CH1 : 100 mV/div, 0,1 mS/div
  CH2 : 5 V/div (accionador)

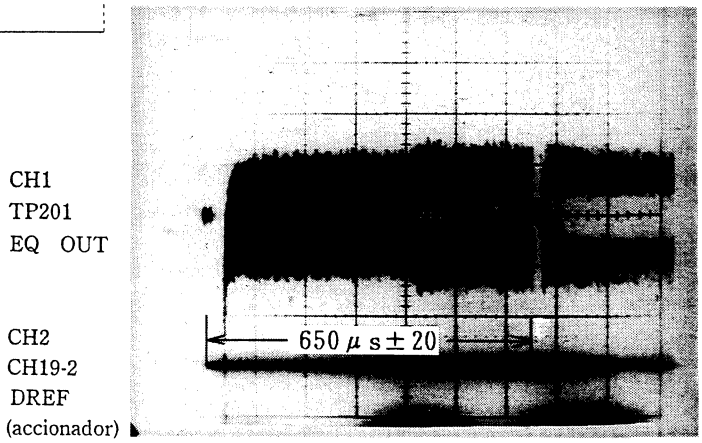
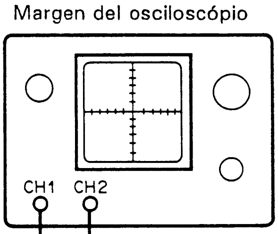


Foto 6-12

Diagrama de ajuste


Margen del osciloscópio
CH1
CH2

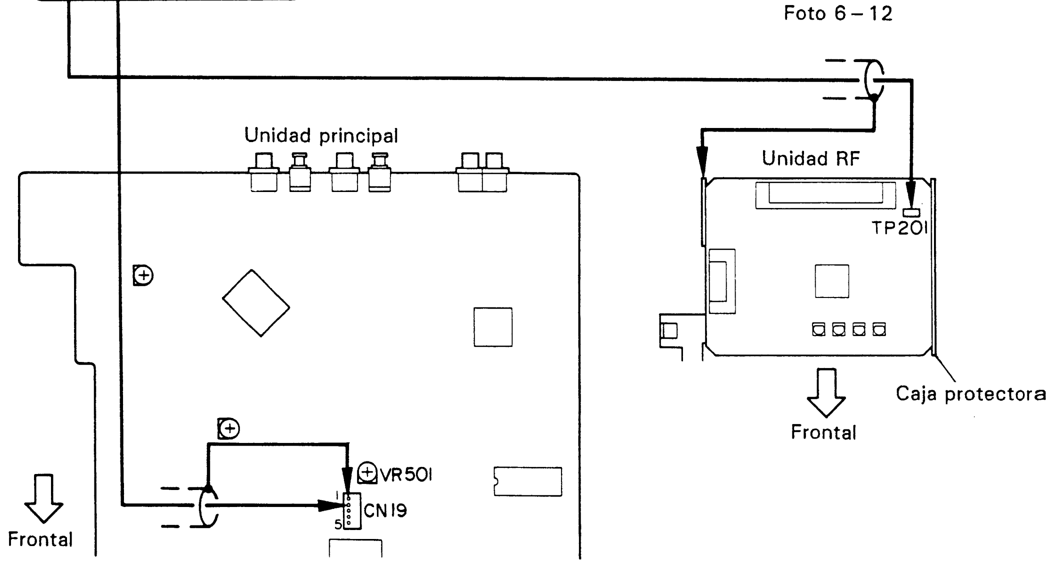

Unidad principal
Unidad RF
TP201
Caja protectora
Frontal
Frontal
VR501
CN19
1
5

Figura 6-14

3. Ajuste de proporción de errores

Propuesta : Corregir los datos reproducidos.
Síntomas en casos de ajuste incorrecto : El seguimiento no se corresponde, fallos en el funcionamiento, silenciamiento del sonido, generación de ruidos.

Instrumento/plantilla de medición	Sección de conexión del instrumento de medición	Estado de DAT	Sección a ser ajustada
● Osciloscópio ● Cinta en blanco : SDA-302	● Osciloscópio En la unidad principal, CH1 : Entre SYMN (JP (ERR FLG) o patilla IC501-33) y DGND (CN19-1) CH2 : Entre DREF (CN19-2) y DGND (CN19-1)	● Modos REC y PLAY	● En la unidad principal : VR504

Procedimiento de ajuste

Preparación

- Grabe una señal musical o una señal de prueba adecuada en la cinta en blanco (SDA-302) en los modos SP y LP durante 15 segundos respectivamente.

1. Reproduzca la parte grabada y ajuste de forma que la bandera de error aparezca al máximo (72 picos máximos) en la forma de onda del osciloscópio como se muestra en la foto 6-13.

Forma de onda

- Margen del osciloscópio
  CH1 : 5 V/div, 2,5 mS/div
  CH2 :

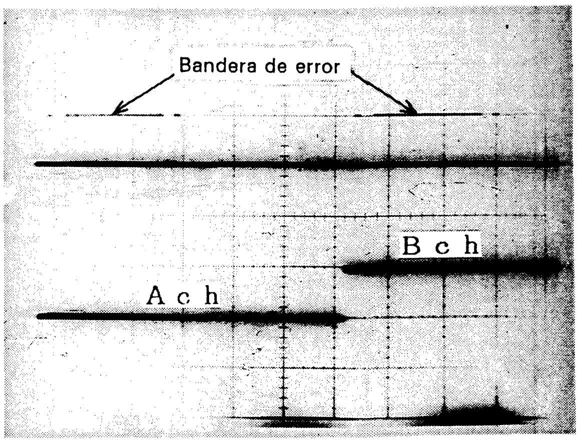
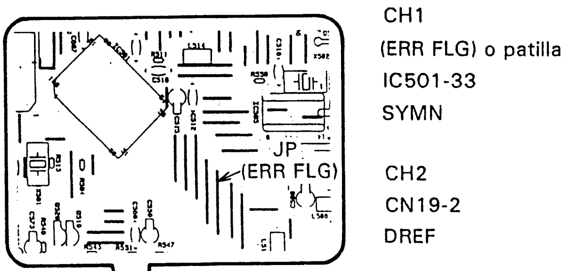

Bandera de error
A c h
B c h

Foto 6-13

Diagrama de ajuste


JP
(ERR FLG)
CH1
(ERR FLG) o patilla
IC501-33
SYMN
CH2
CN19-2
DREF

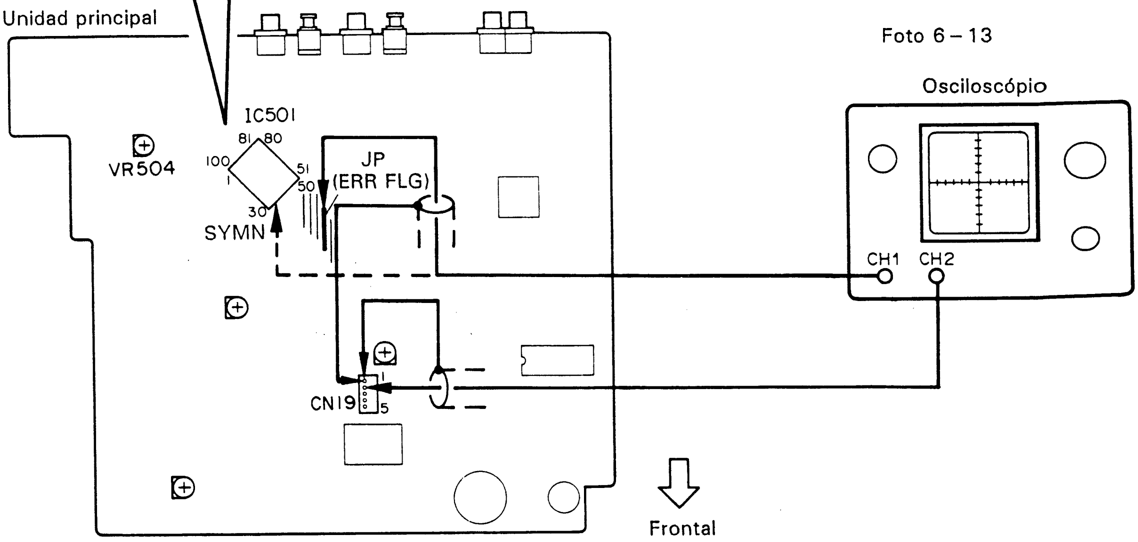

Unidad principal
Osciloscópio
IC501
81
80
100
1
51
50
30
SYMN
VR504
JP
(ERR FLG)
CH1
CH2
CN19
1
5
Frontal

Figura 6-15

Forma de onda

- Margen del osciloscópio
  CH1 : 5 V/div, 1 mS/div

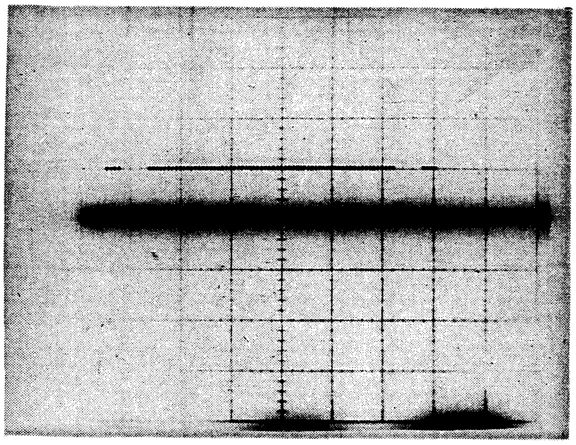


Foto 6 – 14

[Muy bien]

- Proporción de errores : 1 × 10;$^{-4}$
  CH1 : SYMN (JP (ERR FLG) o patilla IC501033)

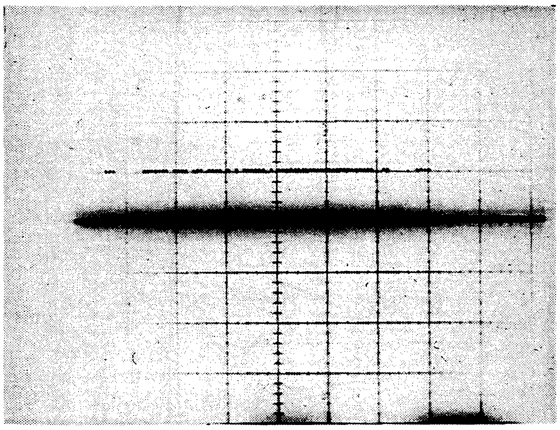


Foto 6 – 15

[El error se corrige y el sonido es normal]

- Proporción de errores : 1 × 10 $^{-2}$
  CH1 : SYMN (JP (ERR FLG) o patilla IC – 501 – 33)

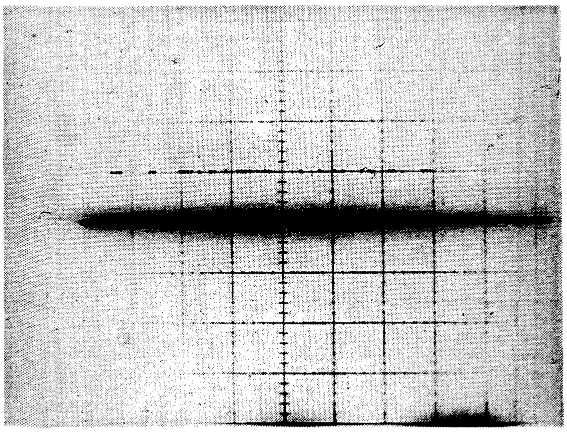


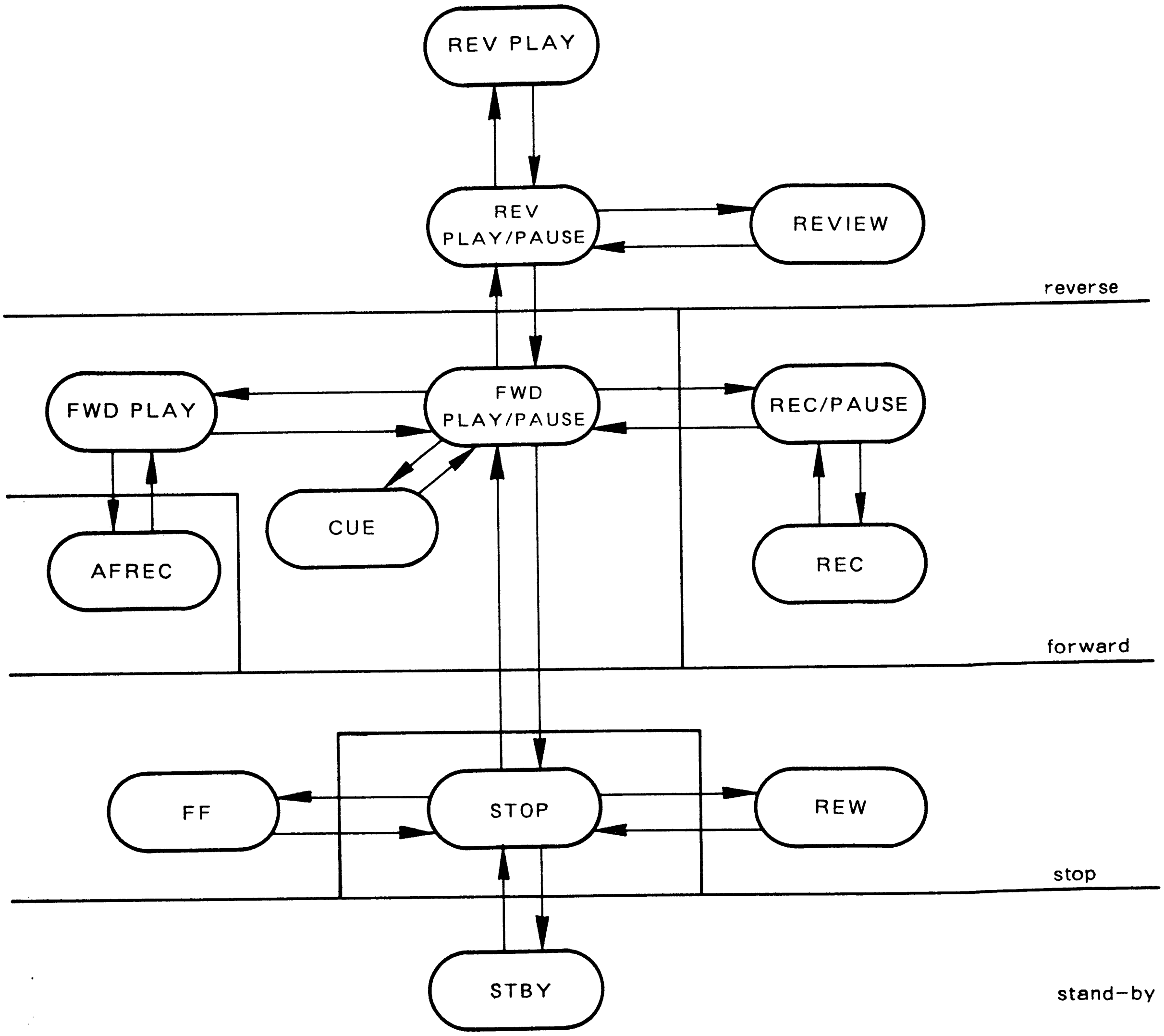
Foto 6 – 16

[La señal de sonido se intercala y es anormal cuando se escucha cuidadosamente]

- Proporción de errores : 1 × 10 $^{-1}$
  CH1 : SYMN (JP (ERR FLG) o patilla IC501 – 33)

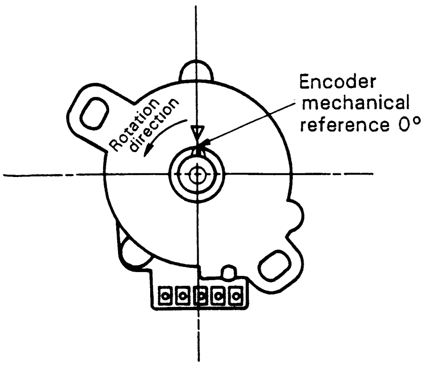
7. FLOW CHART

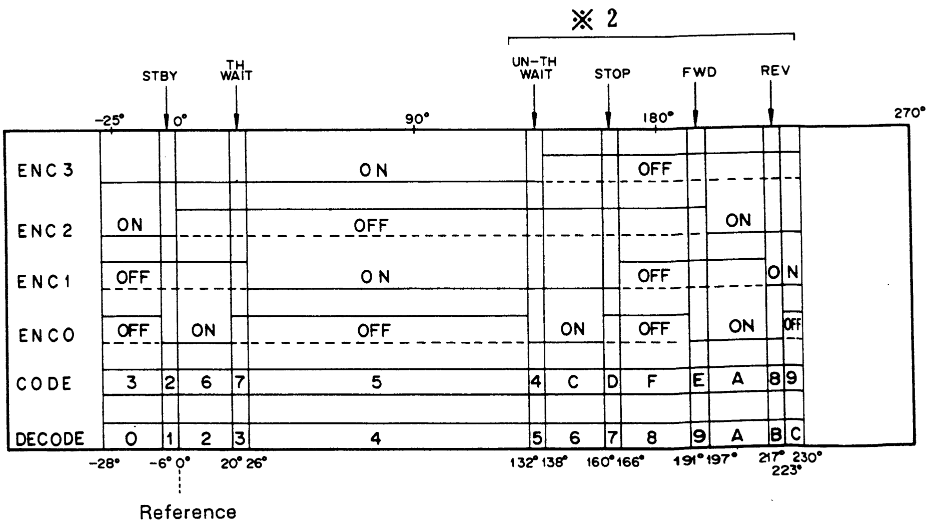
7.1 MECHANICAL MODE TRANSITION DIAGRAM


REV PLAY
REV PLAY/PAUSE
REVIEW
reverse
FWD PLAY
FWD PLAY/PAUSE
REC/PAUSE
CUE
AFREC
REC
forward
FF
STOP
REW
stop
STBY
stand-by

7.2 ENCODER PATTERN

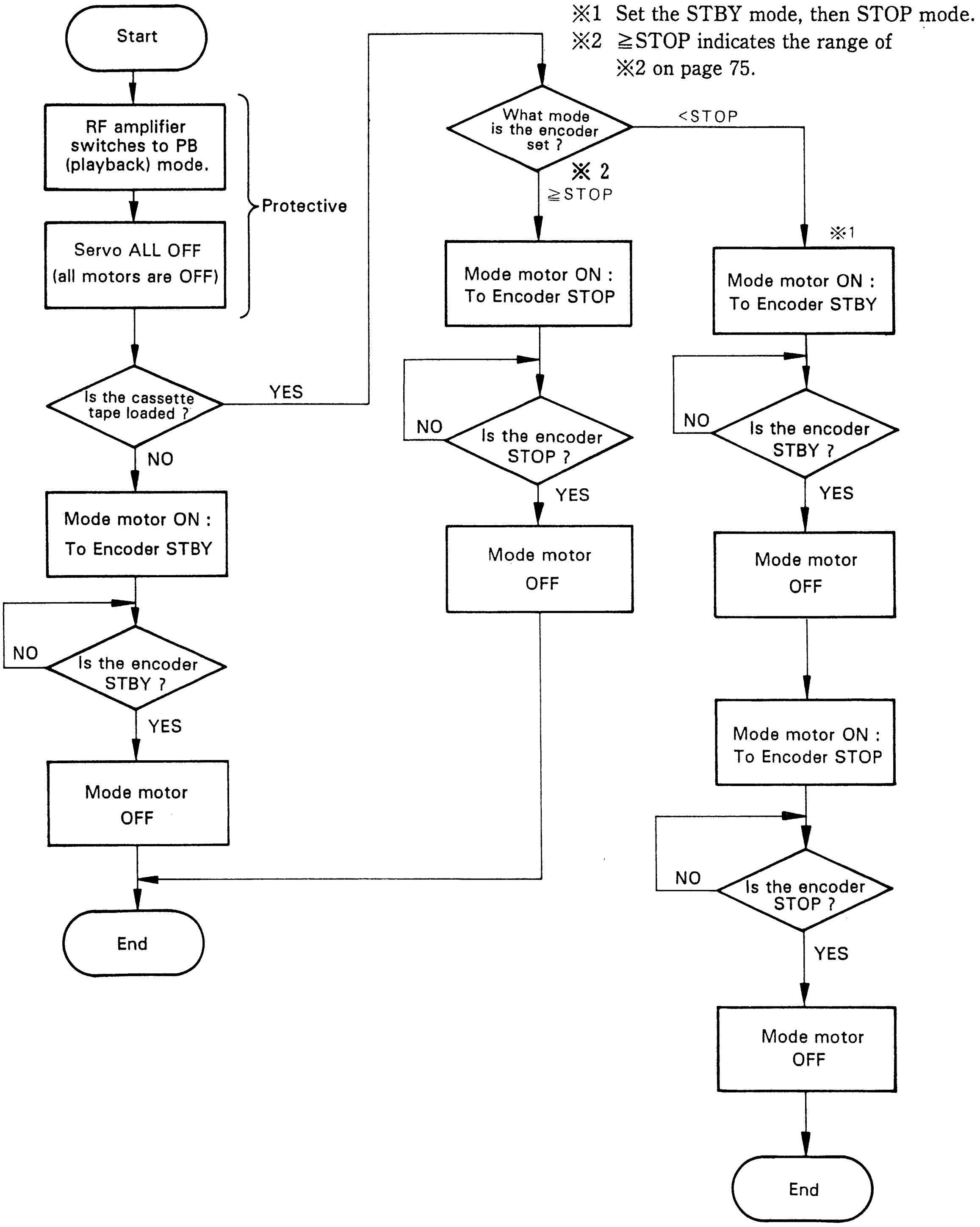
- STBY → TH WAIT (Threading Wait) → UN TH WAIT (Unthreading Wait) → STOP → FWD → RE


Rotation direction
Encoder mechanical reference 0°

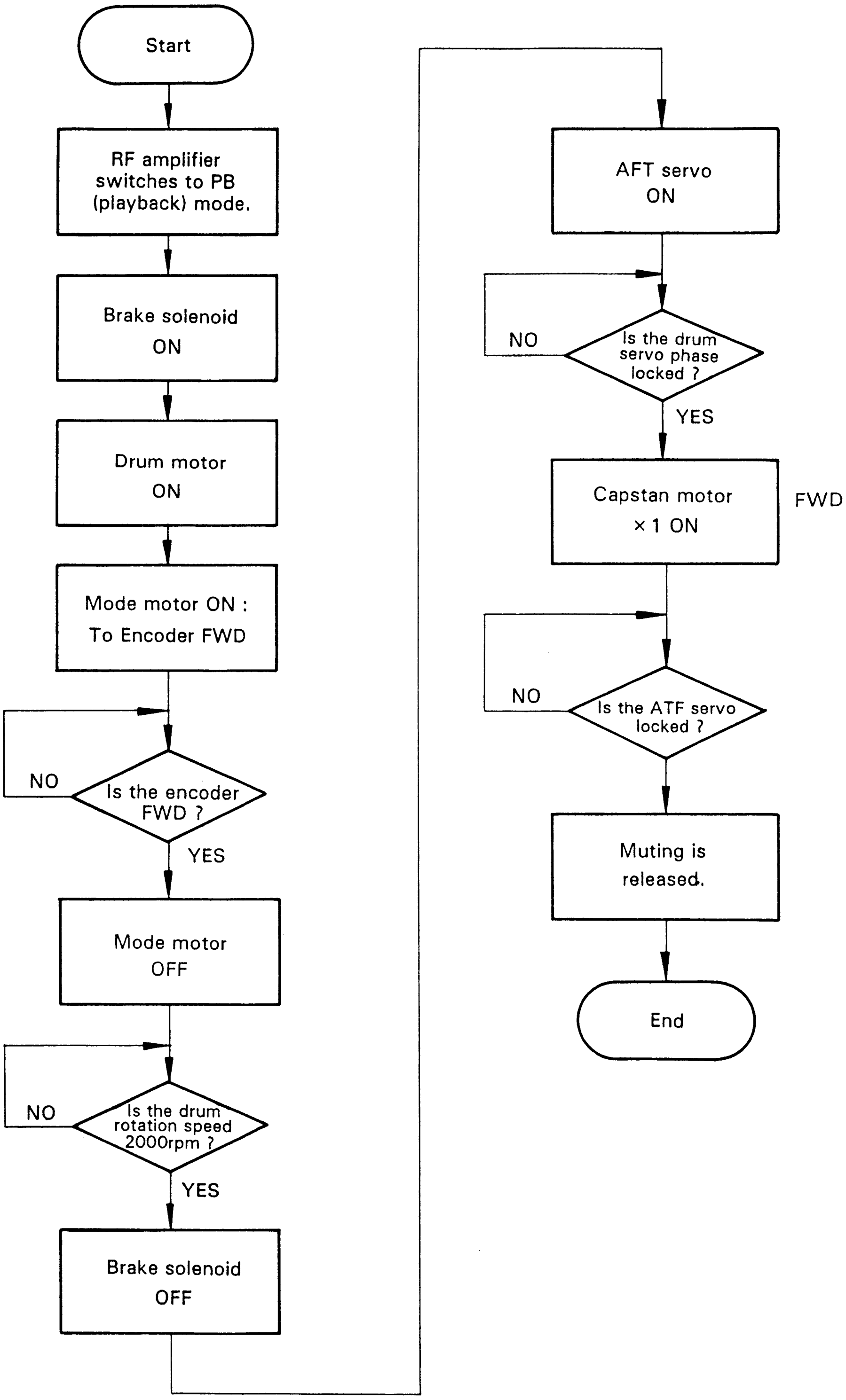

※ 2
STBY
TH WAIT
UN-TH WAIT
STOP
FWD
REV
-25°
0°
90°
180°
270°
ENC 3
ENC 2
ENC 1
ENC 0
CODE
DECODE
ON
OFF
3 2 6 7 5 4 C D F E A 8 9
0 1 2 3 4 5 6 7 8 9 A B C
-28°
-6° 0°
20° 26°
132° 138°
160° 166°
191° 197°
217° 230°
223°
Reference

7.3 POWER ON

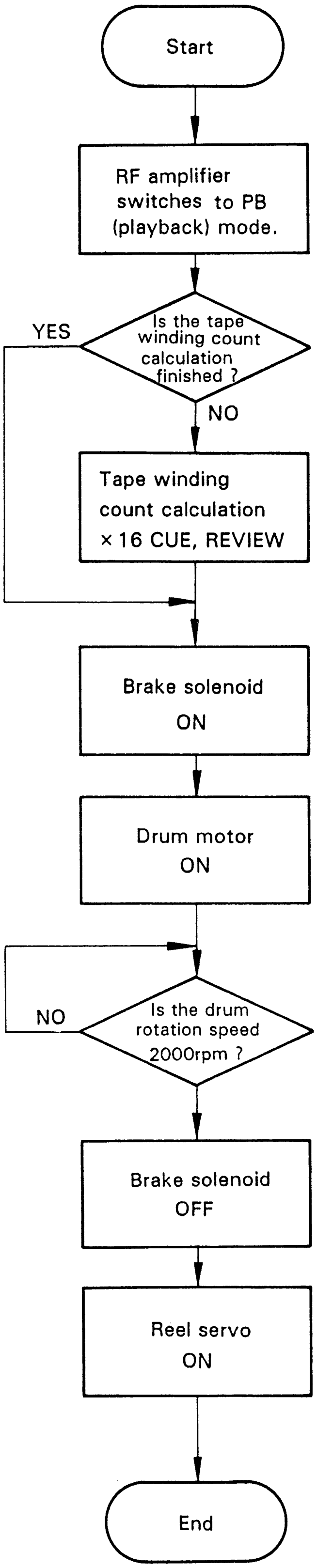
Cassette Tape Loaded → STOP
Cassette Tape Unloaded → STBY (standby, unthreading)


Start
RF amplifier switches to PB (playback) mode.
Servo ALL OFF (all motors are OFF)
Protective
Is the cassette tape loaded ?
YES
NO
Mode motor ON : To Encoder STBY
NO
Is the encoder STBY ?
YES
Mode motor OFF
End
※1 Set the STBY mode, then STOP mode.
※2 ≧STOP indicates the range of ※2 on page 75.
What mode is the encoder set ?
<STOP
※ 2
≧STOP
Mode motor ON : To Encoder STOP
NO
Is the encoder STOP ?
YES
Mode motor OFF
※1
Mode motor ON : To Encoder STBY
NO
Is the encoder STBY ?
YES
Mode motor OFF
Mode motor ON : To Encoder STOP
NO
Is the encoder STOP ?
YES
Mode motor OFF
End

7.4 STOP → PLAY


Start
RF amplifier switches to PB (playback) mode.
Brake solenoid ON
Drum motor ON
Mode motor ON : To Encoder FWD
NO
Is the encoder FWD ?
YES
Mode motor OFF
NO
Is the drum rotation speed 2000rpm ?
YES
Brake solenoid OFF
AFT servo ON
NO
Is the drum servo phase locked ?
YES
Capstan motor ×1 ON
FWD
NO
Is the ATF servo locked ?
Muting is released.
End

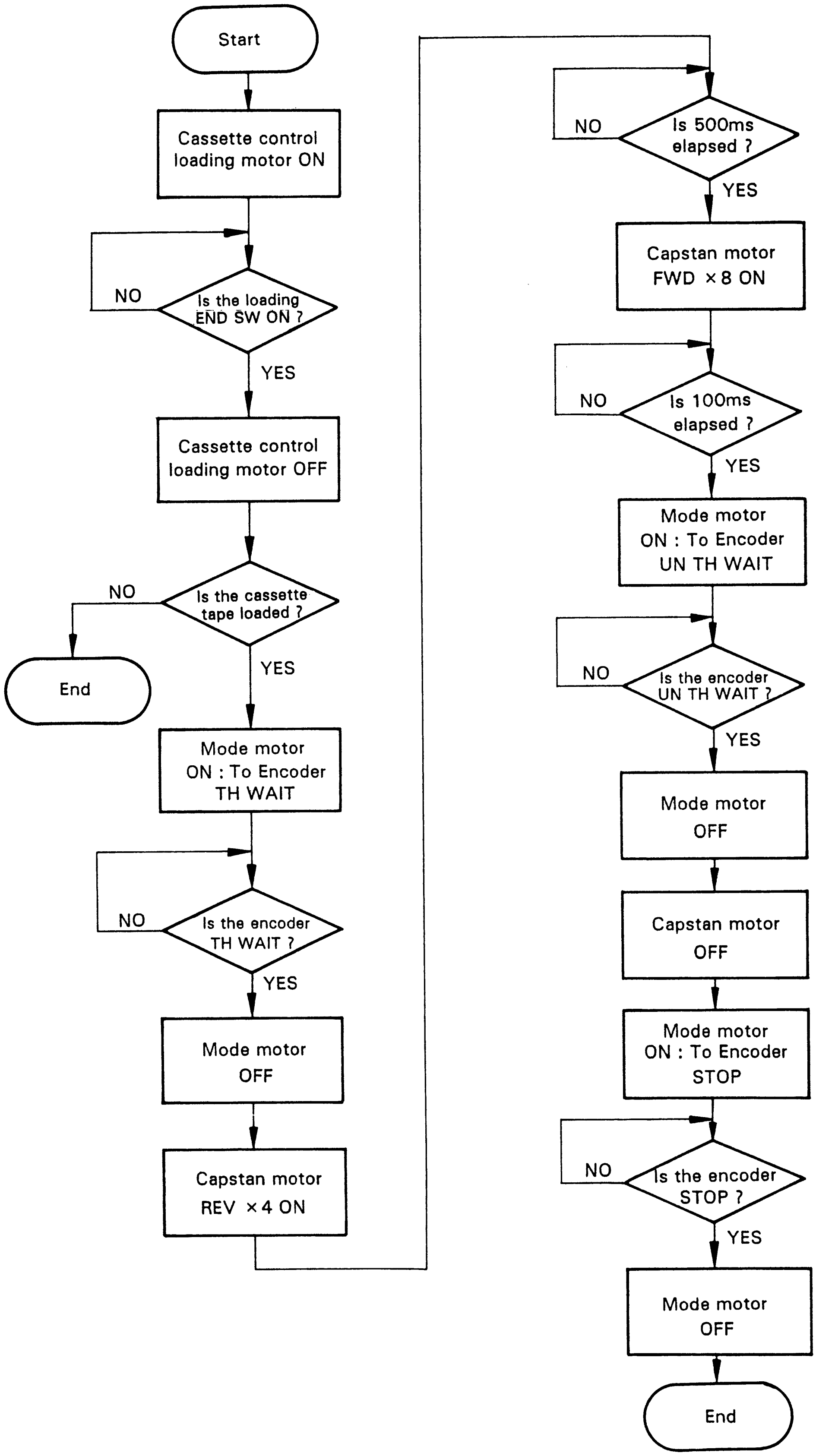
7.5 STOP → FF, REW


Start
RF amplifier switches to PB (playback) mode.
Is the tape winding count calculation finished ?
YES
NO
Tape winding count calculation ×16 CUE, REVIEW
Brake solenoid ON
Drum motor ON
Is the drum rotation speed 2000rpm ?
NO
Brake solenoid OFF
Reel servo ON
End

STOP
↓
CUE, REVIEW
↓
STOP and
Mechanical mode
transition

The encoder position remains at STOP.

7.6 OPEN → CLOSE → STOP


Start
Cassette control loading motor ON
Is the loading END SW ON ?
NO
YES
Cassette control loading motor OFF
Is the cassette tape loaded ?
NO
End
YES
Mode motor ON : To Encoder TH WAIT
Is the encoder TH WAIT ?
NO
YES
Mode motor OFF
Capstan motor REV ×4 ON
Is 500ms elapsed ?
NO
YES
Capstan motor FWD ×8 ON
Is 100ms elapsed ?
NO
YES
Mode motor ON : To Encoder UN TH WAIT
Is the encoder UN TH WAIT ?
NO
YES
Mode motor OFF
Capstan motor OFF
Mode motor ON : To Encoder STOP
Is the encoder STOP ?
NO
YES
Mode motor OFF
End

8. DAT CASSETTE TAPE OPERATION DESCRIPTION

When the cassette tape placed on the tray is slid into the main body, the protrusion at portion Ⓐ on the plate contacts portion Ⓑ of the tape. As shown in Fig. 8-1, the claw of portion Ⓑ is pushed up while the tape passes the protrusion on the plate. The protrusion on the plate then contacts the notch of the slider, and the slider gradually opens as shown in Fig. 8-1 as the tape enters the main body. At this point, when the claw of the tape moves down into the Hall in portion Ⓒ of the slider, the slider is retained open. Then, when the container moves down to mount the tape, the tape lid contacts the sensor bracket of the mechanical unit, pushing the lid up. At this time, portion Ⓓ of the lid contacts portion Ⓔ of the brake lever to remove the brake lever from the reel, so that the tape will be free.

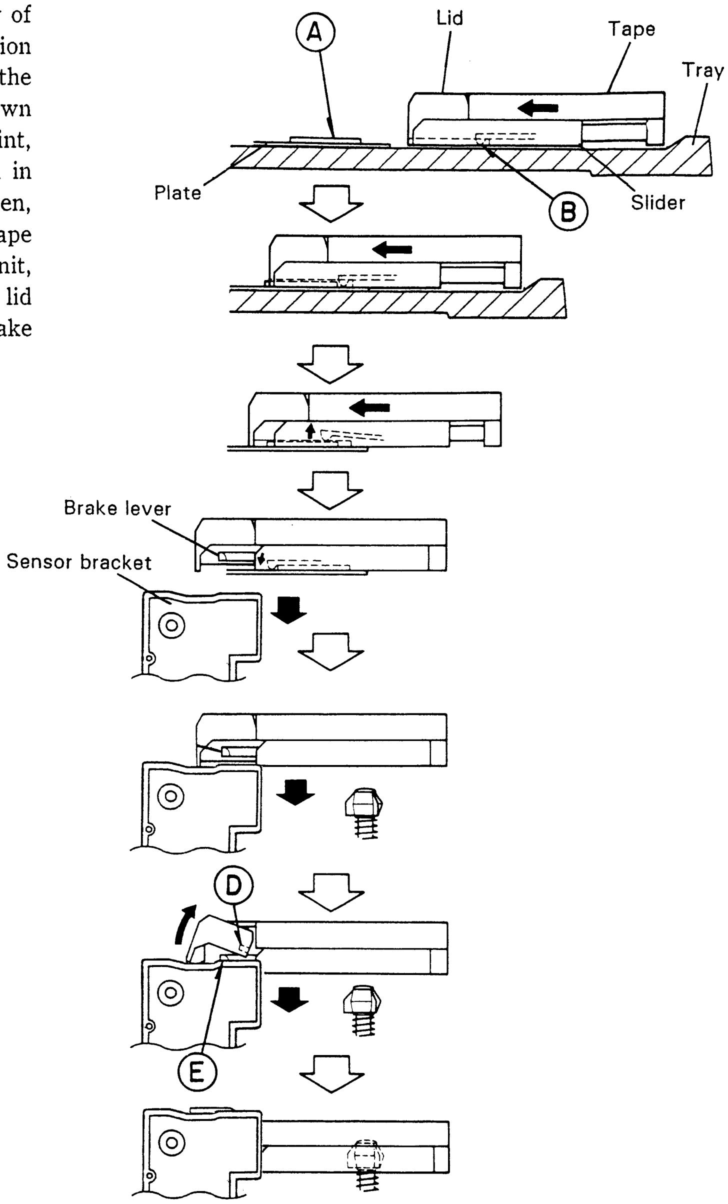
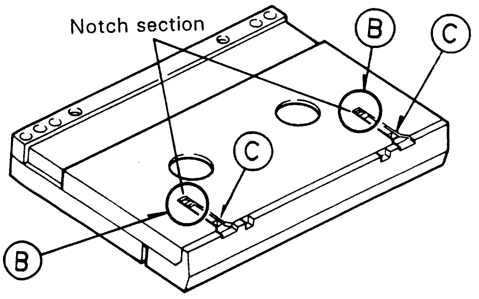


Fig. 8-1 Tape motion



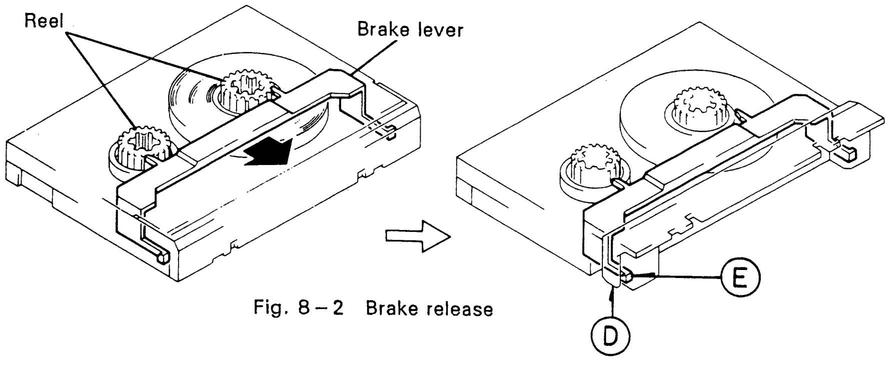


Fig. 8-2 Brake release

9. DAT MECHANICAL UNIT OPERATION DESCRIPTION

9.1 OUTLINE OF MECHANICAL SECTION

The mechanical section of this machine consists of driving DD motors each for the drum and the capstan, mode switch DC motor, plunger for reel brake ON/OFF. The mechanical status is detected by a 4-bit rotary encoder to control the mode change motor. (Fig. 9－1)

9.2 BASIC MECHANICAL UNIT MODE

The mechanical unit uses the following four basic modes :

① Unthreading mode (Fig. 9－2)
② STOP mode (Fig. 9－3)
③ PLAY mode (Fig. 9－4)
④ FF/REW mode (Fig. 9－3)
[Although the mechanical operating state is the same as in the STOP mode, the reel is rotated by the capstan motor during brake OFF (plunger OFF) in the FF/REW mode.]

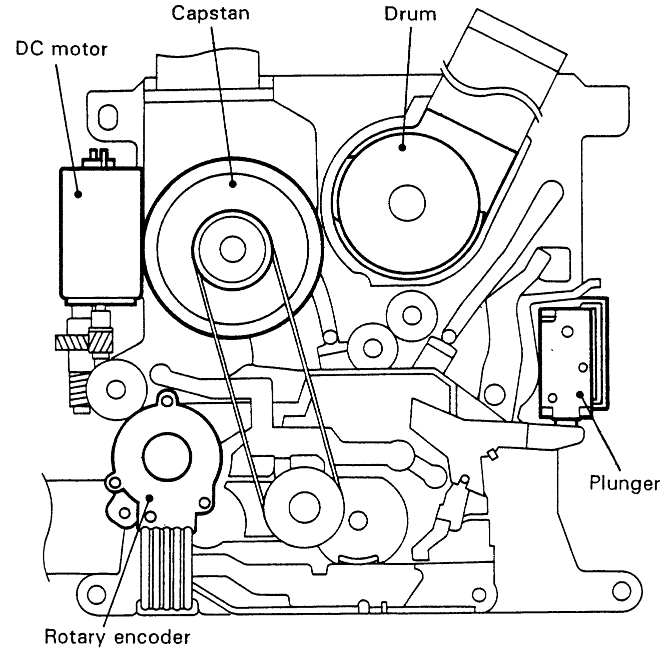


Fig. 9－1

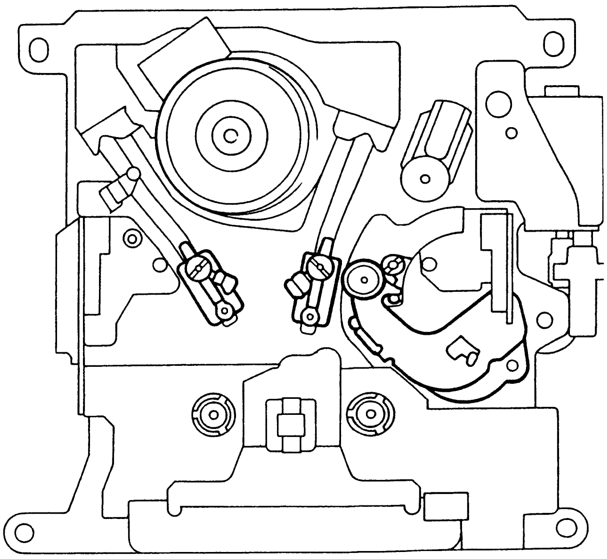


Fig. 9－2 Unthreading mode

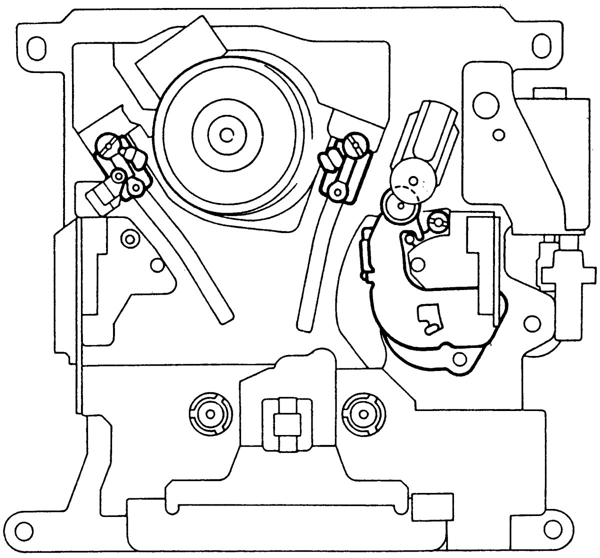


Fig. 9－3 STOP or FF/REW mode

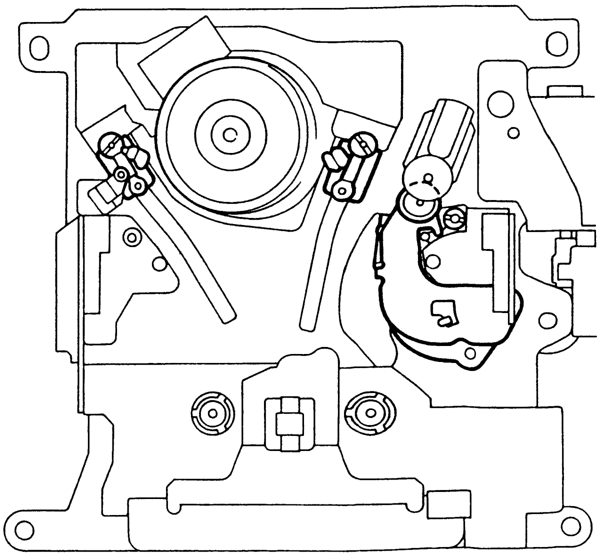


Fig. 9－4 PLAY mode

9.3 MODE CHANGE

The mechanical mode is changed as follows. The driving power transmission path of the power motor assembly (mode change motor) is shown in Fig. 9-5.

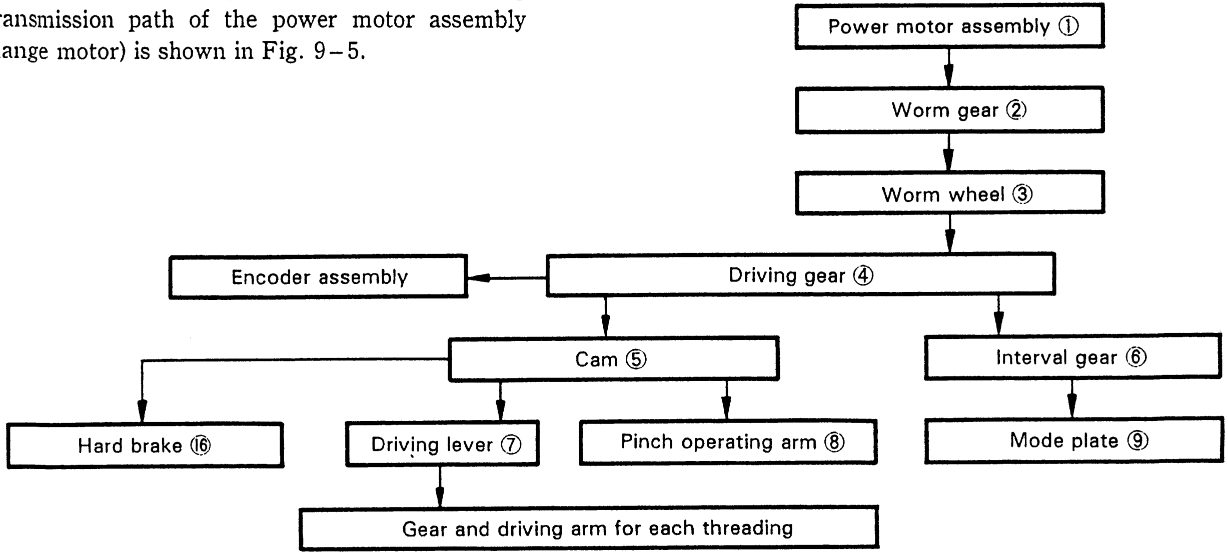
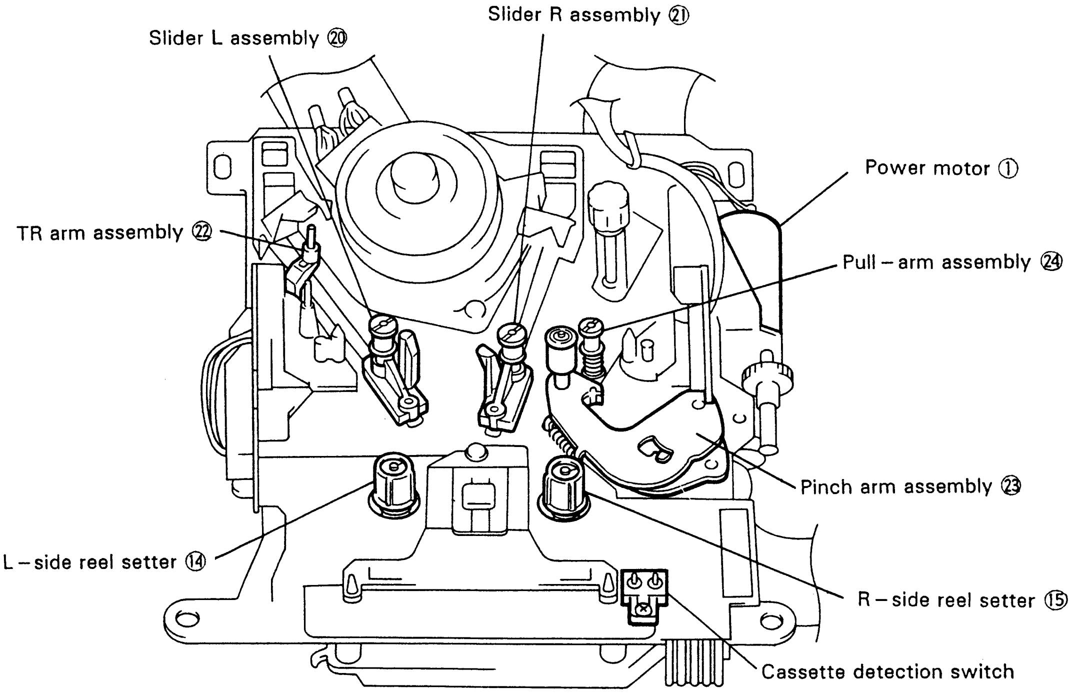

Power motor assembly ①
Worm gear ②
Worm wheel ③
Encoder assembly
Driving gear ④
Cam ⑤
Interval gear ⑥
Hard brake ⑯
Driving lever ⑦
Pinch operating arm ⑧
Mode plate ⑨
Gear and driving arm for each threading

Fig. 9-5 Power transmission path block diagram

9.3.1 Unthreading Mode → STOP Mode (threading mode)

1. In the unthreading mode, the mechanical section is in the state shown in Fig. 9-6, in which the slider L assembly ⑳, R assembly ㉑, pinch arm assembly ㉓, and pull-arm assembly ㉔ are located on the front side.
2. When the cassette tape is loaded, the cassette detection switch is turned ON. Then, power motor ① starts rotating, and hard brake ⑯ fixes R-side reel setter ⑮. (See Fig. 9-9.)


Slider L assembly ⑳
Slider R assembly ㉑
Power motor ①
TR arm assembly ㉒
Pull-arm assembly ㉔
Pinch arm assembly ㉓
L-side reel setter ⑭
R-side reel setter ⑮
Cassette detection switch

NOTE : View from the top : hereinafter indicated Top

Fig. 9-6 Unthreading mode

3. Power motor ① rotates counterclockwise as shown in Fig. 9-7. The power is transmitted to worm gear ②, worm wheel ③, and driving gear ④ under the reel base assembly in that order.

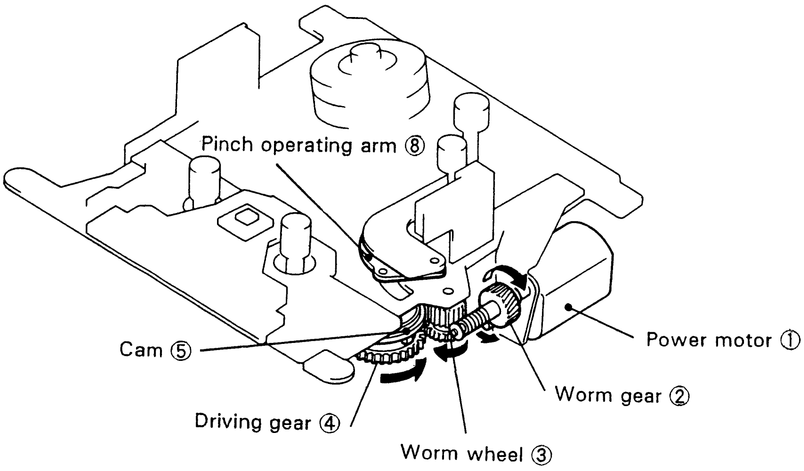
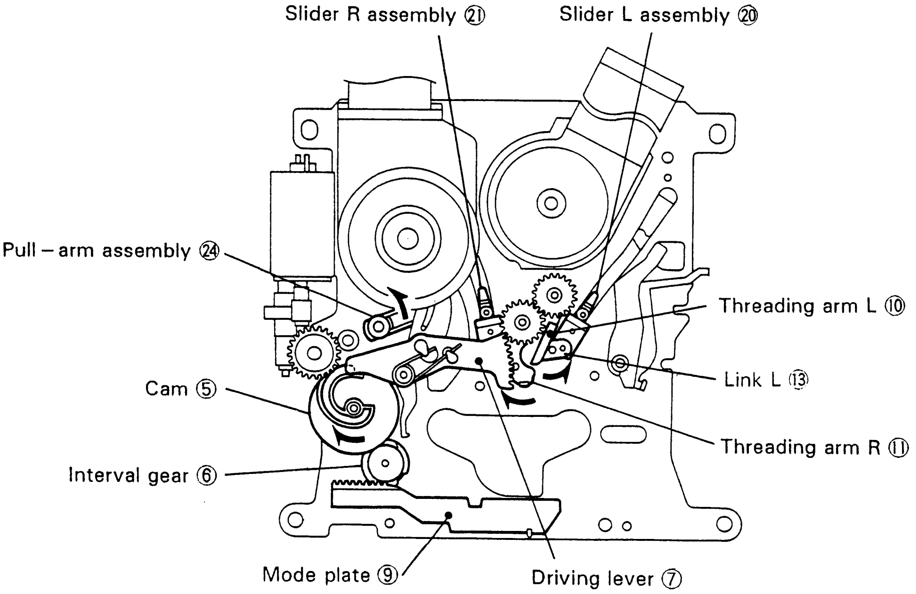

Pinch operating arm ⑧
Cam ⑤
Power motor ①
Worm gear ②
Driving gear ④
Worm wheel ③

Fig. 9-7 (Top)

4. In the this power transmission method, driving gear ④ rotates in the direction indicated by the arrow shown in Fig. 9-7. (See Fig. 9-8 for the following.) Cam ⑤ rotating synchronously with driving gear ④ is directly connected to the upper side of driving gear ④ and also rotates in the arrow direction. The driving power of driving gear ④ is output to two systems of interval gear ⑥ and cam ⑤. Interval gear ⑥ performs the intermittent operation and is stopped until the STOP mode is set. Driving lever ⑦ interlocking with cam ⑤ rotates about 135° from the unthreading state shown in Fig. 9-8. According to this motion, the power is transmitted to the arm driving gears. Pull-arm assembly ㉔ and threading arm L ⑩ rotate counterclockwise and threading arm R ⑪ rotates clockwise to start threading. Threading arm L ⑩ and slider L assembly ⑳ are linked via link L ⑬; the rotational power of threading arm L ⑩ generates the linear motion of slider L assembly ⑳. Threading arm R ⑪ also produces the same results.


Slider R assembly ㉑
Slider L assembly ⑳
Pull-arm assembly ㉔
Threading arm L ⑩
Link L ⑬
Cam ⑤
Threading arm R ⑪
Interval gear ⑥
Mode plate ⑨
Driving lever ⑦

NOTE : View from the bottom side : hereinafter indicated Bottom

Fig. 9-8

5. As threading arm L ⑩ and R ⑪ rotate, both slider L assembly ⑳ and R assembly ㉑ move along the groove of the mechanical chassis. As pull-arm assembly ㉔ rotates, pinch arm assembly ㉓ is pulled and starts rotating (see Fig.s 9-10 and 9-11). (At this time the tape is extracted from L-side reel setter ⑭ by sliders L ⑳, R ㉑, and pull-arm assembly ㉔.)

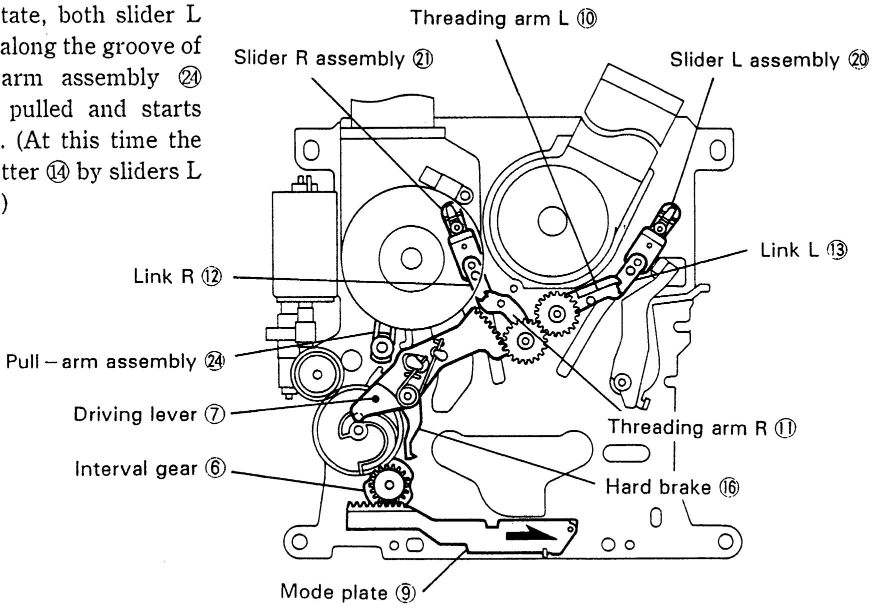
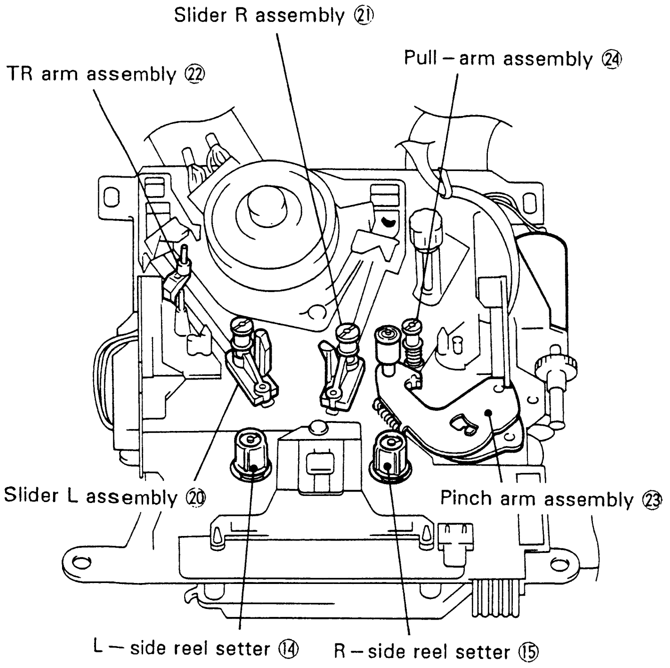

Threading arm L ⑩
Slider R assembly ㉑
Slider L assembly ⑳
Link L ⑬
Link R ⑫
Pull-arm assembly ㉔
Driving lever ⑦
Interval gear ⑥
Threading arm R ⑪
Hard brake ⑯
Mode plate ⑨

Fig. 9-9 (Bottom)

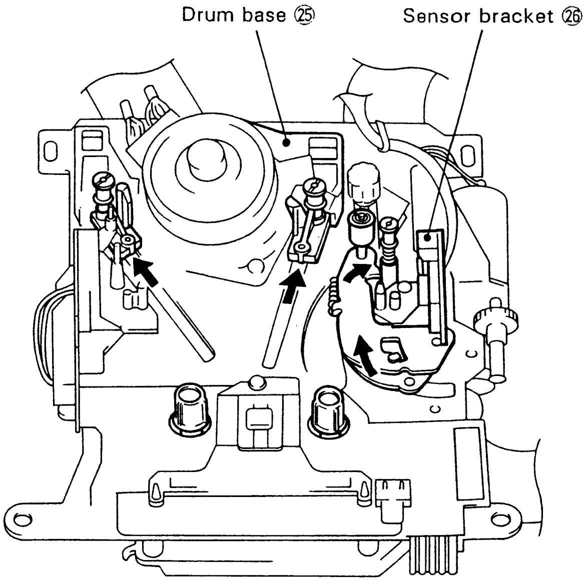
6. As driving gear ④ rotates, sliders L ⑳ and R ㉑ are press-fit into the groove of drum base ㉕; pull-arm assembly ㉔ is press-fit into sensor bracket R ㉖. At this time, if sliders L ⑳, R ㉑, and pull-arm assembly ㉔ stop, driving gear ④ continues rotating because it provides the specified press-fit force by the force of the spring in each gear.

Then, hard brake ⑯ stopping R-side reel setter ⑮ goes OFF to rotate the drum, completing the threading operation.


Slider R assembly ㉑
TR arm assembly ㉒
Pull-arm assembly ㉔
Slider L assembly ⑳
Pinch arm assembly ㉓
L-side reel setter ⑭
R-side reel setter ⑮

Unthreading state (Top)

Fig. 9-10


Drum base ㉕
Sensor bracket ㉖

STOP state (Top)

Fig. 9-11

9.3.2 STOP, PLAY, REV, FF/REW operations

1. When the STOP state shown in Fig. 9-11 is set, the gear mode is as shown in Fig. 9-9. At this time, driving lever ⑦ is stopped and interval gear ⑥ can be rotated. Rotation of interval gear ⑥ moves mode plate ⑨ to the left and right. This motion of mode plate ⑨ determines the mode. Rotation of driving gear ④ causes interval gear ⑥ to rotate so that mode plate ⑨ will move to the left side viewed from the top, in Fig. 9-12. The motion of mode plate ⑨ is classified into four points as shown in Fig. 9-12, viewed from the bottom. As mode plate ⑨ moves, clutch drum ⑲ shown in Fig. 9-13 moves up and down to rotate REV brake ⑰ and TR lever ⑱ (Fig. 9-14).

   However, for the pinch roller press-fit, the power is transmitted by cam ⑤ coaxial and synchronous with driving gear ④ from the bottom side to the top side of the mechanical chassis; cam ⑤ → pinch operating arm ⑧ (linked with pinch arm assembly and pinch press-fit spring ㉗ → pinch arm assembly ㉓ shown in Fig.s 9-15 and 9-16. When cam ⑤ rotates in the direction indicated by the arrow, pinch arm assembly ㉓ rotates in the press-fit direction.

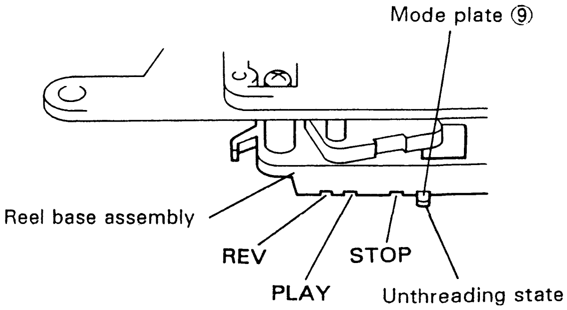

Mode plate ⑨
Reel base assembly
REV
STOP
PLAY
Unthreading state

Fig. 9-12

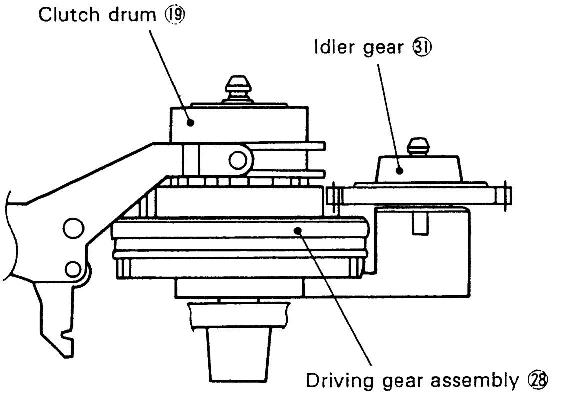

Clutch drum ⑲
Idler gear ㉛
Driving gear assembly ㉘

Fig. 9-13

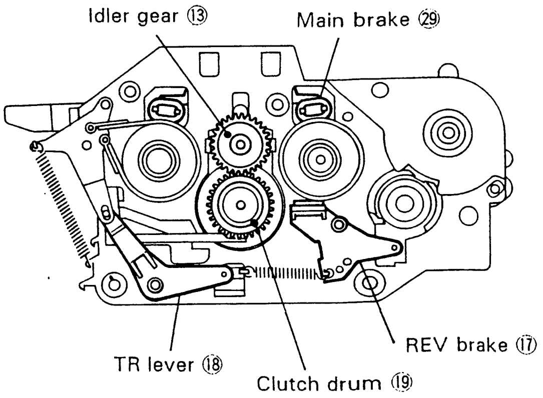
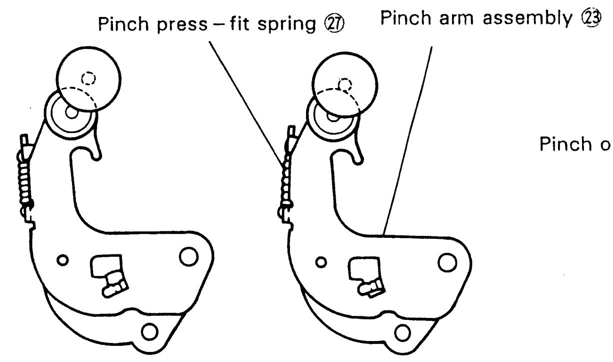

Idler gear ⑬
Main brake ㉙
TR lever ⑱
Clutch drum ⑲
REV brake ⑰

Fig. 9-14


Pinch press-fit spring ㉗
Pinch arm assembly ㉓

STOP state

PLAY state

Fig. 9-15

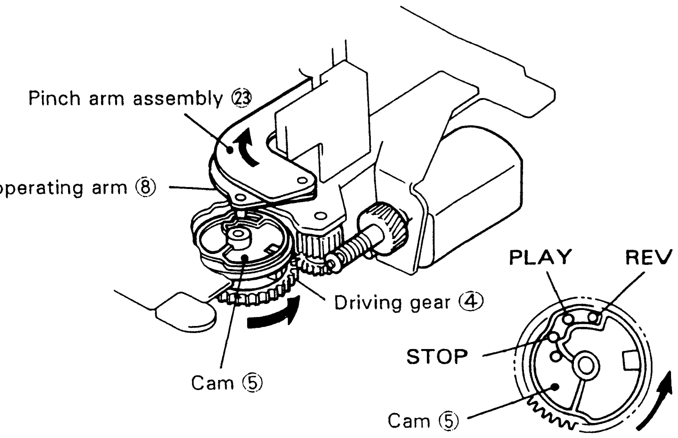

Pinch arm assembly ㉓
Pinch operating arm ⑧
Driving gear ④
Cam ⑤
PLAY
REV
STOP
Cam ⑤

Fig. 9-16

2. Although clutch drum ⑲ moves up/down depending on the motion of mode plate ⑨, driving gear assembly ㉘ is limited in torque as shown in Fig. 9-13 (page 85) by the mechanism of the felt clutch placed between upper and lower gears. Downward motion of clutch drum ⑲ causes the upper and lower gears to be directly connected, activating FF/REW.
3. Main brake ㉙ works only when plunger ㉚ is ON. When the plunger is ON, clutch drum ⑲ is freed via change lever ㊲. Idler gear ㉛ oscillates to the left and right by the power transmitted from capstan ㉝ by belt ㉞ and transmits the power to the reel set. (See Fig.s 9-14 and 9-17.)
4. The following shows the operations in each mode : (See Table 1.)

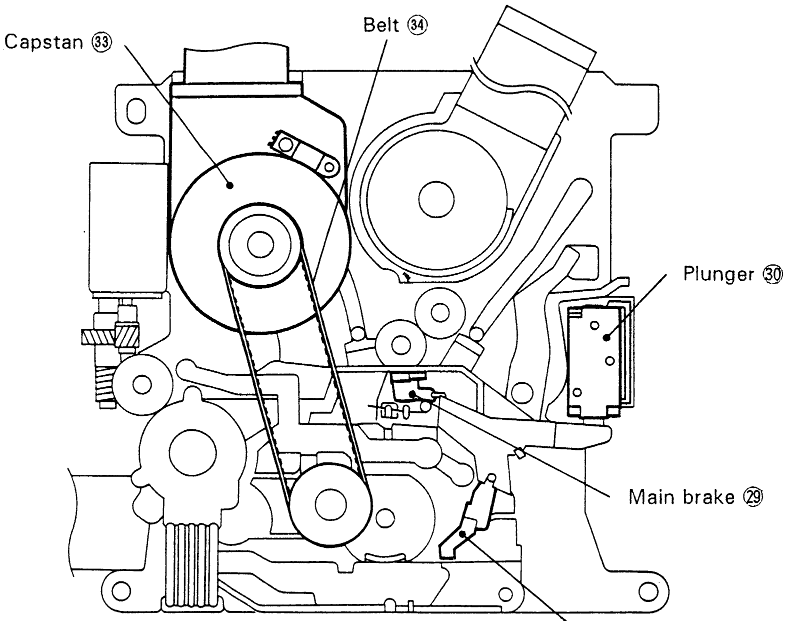


Fig. 9-17 (Bottom)

	Pinch Roller Press-fit	Clutch Drum	REV Brake	TR Lever
STOP	OFF	Down (locked)	OFF	STOP state
FF. REW (search mode)	OFF	Down (locked)	OFF	STOP state
PLAY. REC CUE. PAUSE	ON	Up (free)	OFF	PLAY state
REVIEW	ON	Up (free)	ON	STOP state

Table 1 Operation matrix

9.3.3 STOP Mode → Unthreading Mode

The basic operation is the reverse operation from the unthreading mode to the STOP mode. The main difference is to wind the tape into the cassette case.

1. Power motor ① rotates for a short time and fixes R-side reel setter ⑮ by hard brake ⑯.
2. Power motor ① rotates to start moving slider L and R assemblies ⑳ and ㉑, pull-arm assembly ㉔, and pinch arm assembly ㉓ (trying to return by the spring force) forward to the unthreading position along the groove, and simultaneously to rotate capstan ㉝, so that power is transmitted to L-side reel setter ⑭ via idler gear ㉛. Thus, guides move from the STOP position to the unthreading position while L-side reel setter ⑭ winds the tape.
3. When all the guides are housed in the cassette tape cas power motor ① stops. For a while after the motor stop L-side reel setter ⑭ is rotated to completely wind th tape, then the capstan motor is stopped to stop L-sic reel setter ⑭.
4. Power motor ① is rotated to release hard brake (locking R-side reel setter ⑮, and power motor ① stopped to terminate the operation.

9.3.4 Tape Pass

The following diagram shows the path as the tape is wound from L-side reel setter ⑭ to R-side reel setter ⑮ in PLAY mode. The tape is shown by the thick line in the diagram.

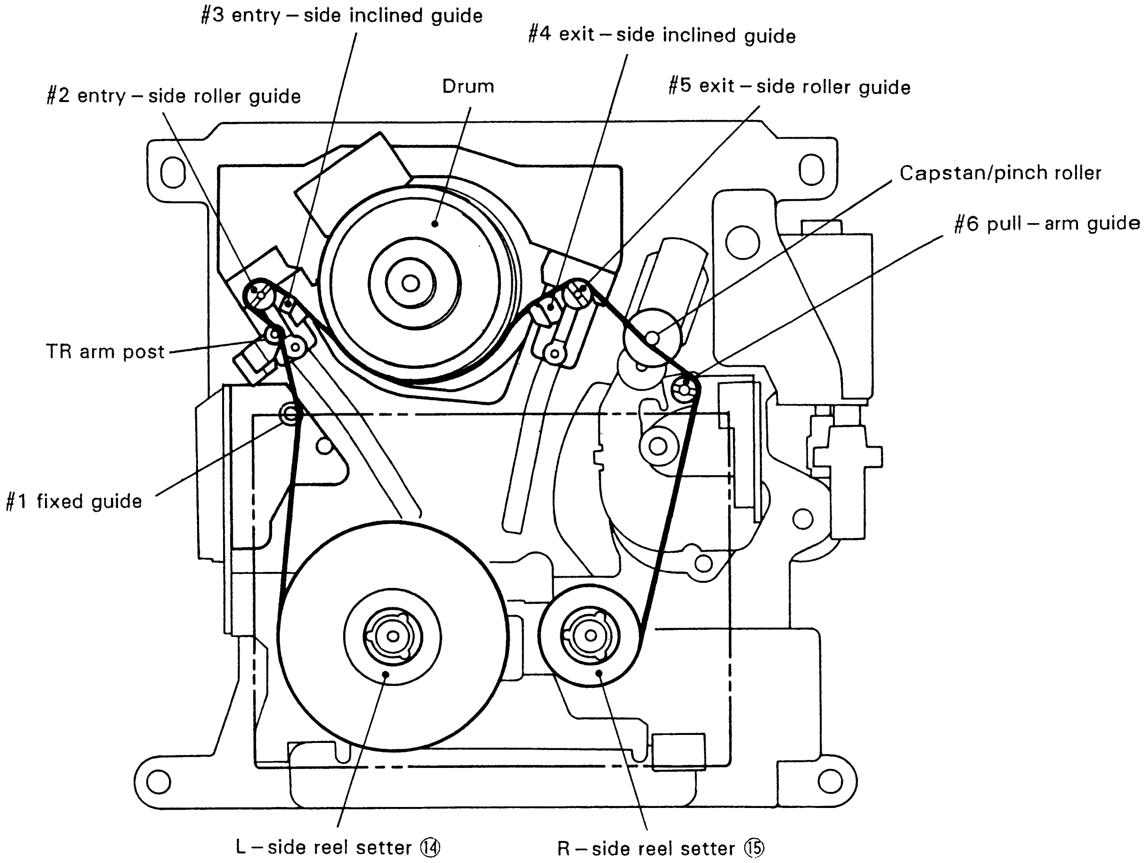
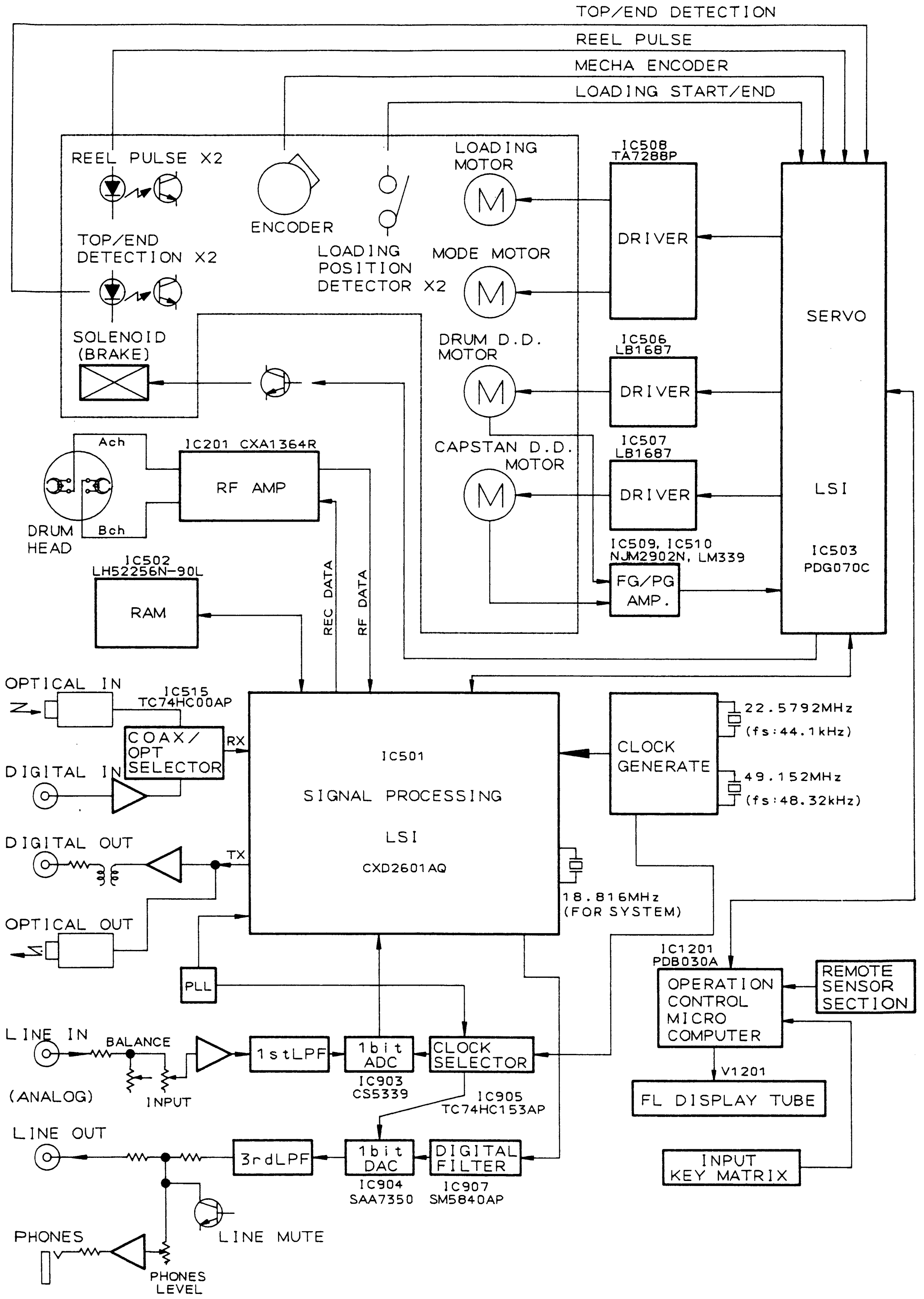

#3 entry-side inclined guide
#4 exit-side inclined guide
#2 entry-side roller guide
Drum
#5 exit-side roller guide
Capstan/pinch roller
#6 pull-arm guide
TR arm post
#1 fixed guide
L-side reel setter ⑭
R-side reel setter ⑮

Fig. 9-18 (Top)

10. BLOCK DIAGRAM


TOP/END DETECTION
REEL PULSE
MECHA ENCODER
LOADING START/END
REEL PULSE X2
ENCODER
LOADING MOTOR
TOP/END DETECTION X2
LOADING POSITION DETECTOR X2
MODE MOTOR
SOLENOID (BRAKE)
DRUM D.D. MOTOR
CAPSTAN D.D. MOTOR
IC508 TA7288P
DRIVER
IC506 LB1687
DRIVER
IC507 LB1687
DRIVER
IC509, IC510 NJM2902N, LM339
FG/PG AMP.
SERVO
LSI
IC503 PDG070C
Ach
Bch
DRUM HEAD
IC201 CXA1364R
RF AMP
IC502 LH52256N-90L
RAM
REC DATA
RF DATA
OPTICAL IN
IC515 TC74HC00AP
COAX/ OPT SELECTOR
RX
DIGITAL IN
DIGITAL OUT
TX
OPTICAL OUT
IC501
SIGNAL PROCESSING
LSI
CXD2601AQ
CLOCK GENERATE
22.5792MHz (fs:44.1kHz)
49.152MHz (fs:48.32kHz)
18.816MHz (FOR SYSTEM)
PLL
IC1201 PDB030A
OPERATION CONTROL MICRO COMPUTER
REMOTE SENSOR SECTION
V1201
FL DISPLAY TUBE
INPUT KEY MATRIX
LINE IN
(ANALOG)
BALANCE
INPUT
1stLPF
1bit ADC
IC903 CS5339
CLOCK SELECTOR
IC905 TC74HC153AP
LINE OUT
3rdLPF
1bit DAC
IC904 SAA7350
DIGITAL FILTER
IC907 SM5840AP
LINE MUTE
PHONES
PHONES LEVEL

11. IC INFORMATION

As to the block diagrams of IC201, 501, 506, 507, 513 and 903, refer to pages 13 – 15.

■ IC201 (CXA1364R) : RF RECORDING/PLAYBACK AMPLIFIER

● Pin Function

No.	Pin Name	Description
1	LIM OUT	PB limiter output terminal.
2	LIM GND	GND terminal of PB limiter and RF envelope DET.
3	MOD1 IN	Operation mode change logic input terminal.
4	MOD2 IN	
5	LIM Vcc	Vcc terminal of PB limiter and RF envelope DET.
6	ENV OUT	RF envelope DET output terminal.
7	ENV COMP	Threshold voltage regulation terminal of RF envelope.
8	ENV PEAK	Capacitor connection terminal for holding the RF peak.
9	LIM IN	Input terminal of PB limiter and RF envelope DET.
10	EQ OUT	PCM EQ output terminal.
11	P EV OUT	Capacitor connection terminal for pilot envelope output terminal/peak hold.
12	P EV IN	Pilot GCA input terminal.
13	PLT OUT	Pilot filter output terminal.
14	GCA CTL	Pilot GCA gain control voltage input terminal.
15	EQ PHASE	Terminal for determining the PCM EQ phase characteristics.
16	EQ Q	Terminal for determining the PCM EQ high – pass peak volume.
17	EQ HIGH	Terminal for determining the PCM EQ high – pass peak frequency and pilot filter cut off frequency.
18	EQ LOW	Terminal for determining the PCM EQ low – pass characteristics.
19	PB GND	GND of PB circuit, logic, and regulator.
20	EQ IN	PCM EQ input terminal.
21	SWA OUT	Switch amplifier output terminal.
22	V REG	Regulator output terminal.
23	B HA OUT	Bch head amplifier output terminal.
24	B LPC	DC smoothing capacitor connection terminal of Bch head amplifier DC servo.
25	B PC	Emitter pass control connection terminal of Bch head amplifier first – stage emitter grounding Tr.
26	B HA IN	Bch head amplifier input terminal.
27	B RA OUT	Bch REC amplifier output terminal.
28	HA GND	Head amplifier GND terminal.
29	REC GND	REC amplifier GND terminal.
30	REC BIAS	REC last – stage current amplifier input terminal.
31	HA Vcc	Head amplifier Vcc terminal.
32	REC Vcc	REC amplifier Vcc terminal.
33	A RA OUT	Ach REC amplifier output terminal.
34	A HA IN	Ach head amplifier input terminal.
35	A PC	Emitter pass control connection terminal of Ach head amplifier first – stage emitter grounding Tr.
36	ALPC	DC smoothing capacitor connection terminal of Ach head amplifier DC servo.
37	A HA OUT	Ach head amplifier output terminal.
38	SAG TC	Capacitor connection terminal for correcting the record waveform distortion.
39	A R PCM	Terminal for determining Ach record current.
40	B R PCM	Terminal for determining Bch record current.
41	A R PLT	Terminal for determining Ach pilot signal record current.
42	B R PLT	Terminal for determining Bch pilot signal record current.
43	PB Vcc	Vcc of PB circuit, logic, and regulator.
44	REDT IN	Record signal input terminal.
45	REPB IN	Record/playback change signal input terminal.
46	PIPC IN	PCM/pilot record area change signal input terminal
47	SWP IN	A/B change switching signal input terminal.
48	NRM HLF	Normal speed/half speed change signal input terminal.

■ IC506, IC507 (LB1687) : MOTOR DRIVER

● Pin Function

No.	Pin Name	Description
1	VIN1	Phase-V Hall element input terminal. Logic"H" is VIN1 > VIN2.
2	VIN2	
3	UIN1	Phase-U Hall element input terminal logic"H" is UIN1 > UIN2.
4	UIN2	
5	FC	Frequency characteristics correction terminal
6	GND	GND for other than output
7	FRAME (GND)	GND
8		
9		
10	Vcc 1	Power terminal providing output
11	U OUT	Phase-U output terminal
12	V OUT	Phase-V output terminal
13	W OUT	Phase-W output terminal
14	Rf	Output current detection terminal
15	NC	Not Connect
16	Vcc 2	Power terminal providing power to parts other than output

No.	Pin Name	Description
17	FG in−	FG signal input terminal
18	FG in+	
19	FG OUT	FG amplifier output terminal
20	CR	Hall element input gain can be altered by the voltage of this terminal.
21	VCREF	Control start voltage is determined by the voltage of this terminal.
22	FRAME (GND)	GND
23		
24		
25	VC	Speed single-phase control terminal
26	CD	Receives the current detected by Rf (14 pins).
27	F/RC	F/RC : Normal/reverse control terminal
28	NC	Not Connect
29	WIN1	Phase-W Hall element input terminal. Logic"H" is WIN1 > WIN2.
30	WIN2	

• Truth Table

	Source Sink	Input			Normal/reverse control F/RC
		U	V	W	
1	Phase W → V	H	H	L	L
	Phase V → W				H
2	Phase W → U	H	L	L	L
	Phase U → W				H
3	Phase V → W	L	L	H	L
	Phase W → V				H
4	Phase U → V	L	H	L	L
	Phase V → U				H
5	Phase V → U	H	L	H	L
	Phase U → V				H
6	Phase U → W	L	H	H	L
	Phase W → U				H

● Input

H : Input 1 is at 0.2V potential or much higher than input 2 in each phase.
L : Input 1 is at 0.2V potential or much lower than input 2 in each phase.

● Normal/Reverse Control

H : 2.0 to Vcc2
L : 0 to 0.3V

■ IC503 (PDG070B) : SYSTEM CONTROLLER

• Pin Function

No.	I/O	Pin Name	Description
1	O	AUDR	Signal processing LSI (CXD2601AQ) operating mode change output. "H" for audio mode. Becomes "L" for data mode during postrecording.
2	O	SOLON	Mechanism solenoid brake control output. "H" for brake ON.
3	O	MLMCW	Rotational direction control output of mechanism mode motor and cassette control loading motor. "H" for clockwise rotation.
4	O	LDMON	Cassette control loading motor control output. "H" for loading motor ON.
5	O	MDMON	Mechanism mode motor control output. "H" for mode motor ON.
6	O	TLED	Tape top/end sensor LED on/off control output. LED blinks on a cycle of 3.48ms.
7	O	CMCW	Mechanism capstan motor rotational direction control output. "H" for clockwise rotation. (FWD direction running)
8	O	DMCW	Mechanism drum motor rotational direction control output. "H" for clockwise rotation. (Always "H")
9	O	xCMON	Mechanism capstan motor control output. "H" for capstan motor ON.
10	O	NC	Not used. Retain open.
11	I	LDST	Cassette control loading start detection switch input. "H" for cassette control loading start. ("L" for cassette control unloading completion.)
12	I	xLDEN	Cassette control loading end detection switch input. "L" for cassette control loading completion. ("H" for cassette control unloading start.)
13	I	INH	Cassette tape accidental erase prevention detection switch input. "H" for recording inhibition.
14	I	xHALF	Cassette tape detection switch input. "L" for presence of cassette tape.
15	I	ENC1	Mechanism encoder input 1.
16	I	ENC2	Mechanism encoder input 2.
17	I	ENC3	Mechanism encoder input 3.
18	I	ENC0	Mechanism encoder input 0.
19	O	xRST	Operation control reset output. "L" for operation control reset. "L" is output when the power is ON.
20	O	xOPRQ	Output of communication request to operation control. Operation control starts communications with the system control at the xOPRQ trailing edge. Becomes "L" during communication with the operation control.
21	O	x256	Fs system clock select output. "L" for selecting 256fs. Becomes "H" during 32K playback or 32K analog input recording; "L" during other operation.
22	O	LMUTE	Line mute (analog mute) output. "H" for line mute ON.
23	O	PB4832	Fs system clock select output. Becomes "L" during 44.1K playback or digital input recording; "H" during other operation.
24	O	PLLK	Digital input PLL lock range change control output. Alternatively changes between "L" ⟷ "H" during PLL unlock.
25	O	DIN	Fs system clock select output. Becomes "H" during digital input recording.

No.	I/O	Pin Name	Description
26	O	xDARS	DA-side digital filter (SM5840AP) and AD converter (CS5339) reset output. Becomes "L" during Fs and REC/PB switching or when the power is ON. Normally, "H".
27	O	44PB	Fs system clock select output. Becomes "H" during 44.1K playback ; "L" during other operation.
28	O	xMLE	DA-side digital filter (SM5840AP) mode set latch-enable output. Mode set data is latched at the xMLE leading edge.
29	O	OCSL	Digital input OPT (optical cable)/COAX (coaxial cable) select output. Becomes "L" when OPT is selected.
30	I	MUTE	PB/REC mute (digital mute) output. Connect to the signal processing LSI (CXD2601AQ) MUTE terminal (29 pins). Mutes DA monitor during playback and recorded PCM data during recording.
31	I	MP	Microprocessor mode input terminal. Always fixed to "L" level.
32	I/O	RST	System reset terminal. "L" level active. Connect to the reset IC output.
33		DGND	GND terminal. Connect to GND.
34		NC	Not used. Retain open.
35	I	MCLK	System clock input terminal. Connect to signal processing LSI (CXD2601AQ) MCLK terminal (20 pins). Inputs 9.408MHz.
36	I	SBSY	Frame synchronizing signal input. Connect to signal processing LSI (CXD2601AQ) SBSY terminal (26 pins). Pulse waveform of 30ms cycle during SP and 60ms cycle during LP. (⎍)
37	I	SDSo	Serial data input terminal. Connect to signal processing LSI (CXD2601AQ) SDSO terminal (25 pins).
38	O	SDDI	Serial data output terminal. Connect to signal processing LSI (CXD2601AQ) SDSI terminal (24 pins).
39	O	EXCK	Serial data transfer clock output terminal. Connect to signal processing LSI (CXD2601AQ) EXCK terminal (23 pins).
40	I	NC	Not used. Fixed to "H" level.
41	I	OPSI	Serial data input terminal. Inputs serial data from operation control.
42	O	OPSO	Serial data output terminal. Outputs serial data to operation control. Also, outputs mode set data to DA-side digital filter (SM5840AP) in time-sharing mode.
43	I/O	OPCK	Serial data transfer clock input/output terminal. Inputs serial data transfer clock from operation control. Also, outputs mode set data transfer clock to DA-side digital filter (SM5840AP) in time-sharing mode.
44		AGND	GND terminal of integral AD converter. Connect to GND.
45		AVREF	Reference voltage input terminal of integral AD converter. Connect to 5V.
46		A5V	Positive power supply terminal of integral AD converter. Connect to 5V.
47	I	SWPVR	Switching pulse (SWP) delay volume setting VR input terminal. (Analog input terminal)
48	I	MUTM	Connect to signal processing LSI (CXD2601AQ) MUTM terminal (30 pins). Monitors the intelligent muting state.
49	I	NC	Not used. Fixed to "H" level.
50	I	NC	Not used. Fixed to "H" level.

No.	I/O	Pin Name	Description
51	I	RFENV	RF envelope signal input terminal. Used to detect RF Signal.
52	I	TEND	Tape end sensor input. (Analog input terminal)
53	I	TTOP	Tape top sensor input. (Analog input terminal)
54	I	PLENV	Pilot envelope signal input terminal.
55	I	RFGT	Reel FG-T (take-up side) input terminal.
56	I	RFGS	Reel FG-S (supply side) input terminal.
57	I	CFG	Capstan FG input terminal.
58	I	DFG	Drum FG input terminal.
59	I	DPG	Drum PG input terminal.
60	I	DREF	Drum servo reference signal input terminal.
61	I	MCLK	Channel clock input terminal.
62	I	RFDT	Playback data input terminal.
63	O	SWP	Switching pulse (SWP) output terminal.
64	O	DERR	Drum servo/error voltage output terminal.
65	O	CERR	Capstan servo/error voltage output terminal.
66	O	NC	Not used. Retain open.
67	O	NC	Not used. Retain open.
68	O	PLGCA	RF amplifier (CXA1364R)/pilot GCA control voltage output terminal.
69	I	SYMN	RF-responding C1 check result monitor signal input.
70	I	ERMN	Valid playback data detection signal monitor signal input. "H" for presence of valid playback data. Used to detect RF signal.
71	I	xPOFF	Power-off signal input. Used for processing when power is OFF.
72		D5V	Positive power supply terminal. Connect to 5V.
73		DGND	GND terminal. Connect to GND.
74		D5V	Positive power supply terminal. Connect to 5V.
75	O	ATSY	ATF sink signal output.
76	O	NC	Not used. Retain open.
77	O	NC	Not used. Retain open.
78	O	NC	Not used. Retain open.
79	O	MOD2	RF amplifier (CXA1364R) operation mode change signal output 2.
80	O	MOD1	RF amplifier (CXA1364R) operation mode change signal output 1.

■ IC501 (CXD2601AQ) : PLAYBACK SIGNAL PROCESSING LSI

• Pin Function

No.	Pin Name	I/O	Description
1	A08	O	External RAM address output.
2	A09	O	External RAM address output.
3	VDD	–	+5V
4	A10	O	External RAM address output.
5	A11	O	External RAM address output.
6	A12	O	External RAM address output.
7	A13	O	External RAM address output.
8	A14	O	External RAM address output.
9	XWE	O	External RAM write-enable signal output.
10	XOE	O	External RAM output-enable signal output.
11	XEAN	O	External addressing-enable signal output.
12	TST1	I	Fixed to test input 'L'.
13	XT1O	O	Crystal oscillation circuit 1 output (oscillation frequency : 18.816MHz).
14	XT1I	I	Crystal oscillation circuit 1 input
15	VSS	–	GND
16	XRST	I	Reset when reset input is 'L'.
17	CLKO	O	18.816MHz clock output.
18	XCST	O	SYCK (system clock) generation synchronizing signal output.
19	ATSY	I	ATF sink signal input.
20	MCLK	O	9.408MHz clock output.
21	DREF	O	Drum servo reference signal output
22	SBPM	O	Monitor signal output of data transfer with microcomputer. 'L' for transferable.
23	EXCK	I	Clock input for data transfer with microcomputer.
24	SDSI	I	Serial data input from microcomputer.
25	SDSO	O	Serial data output to microcomputer.
26	SBSY	O	Frame synchronizing signal output for data transfer with microcomputer.
27	COPY	O	Copy information output. 'H' for inhibiting copy.

No.	Pin Name	I/O	Description
28	EMP	O	Emphasis information output. 'H' for emphasis-on.
29	MUTE	I	Mute input. 'H' for muting.
30	MUTM	O	Mute output. 'H' for muting.
31	UNLK	O	RXPLL lock monitor signal output. 'L' indicates locked.
32	ERMN	O	Effective playback data detection signal output. 'H' for presence of effective playback data.
33	SYMN	O	RF-responding C1 check result monitor signal output.
34	CHER	I	Corrected strategy select input. 'H' for C1 → C2 and 'L' for C1 → C2 → C1 → C2.
35	PLCK	O	RFPLL clock output.
36	TST2	I	Fixed to test terminal 'L'.
37	RFDT	I	Playback RF signal input.
38	XCS	I	Chip select input for data transfer with microcomputer. 'L' for transferable.
39	SWP	I	RF switching pulse. 'L' for track A and 'H' for track B.
40	VSS	–	GND
41	PIPC	O	ATF pilot signal/OR-NOT identification signal output of record signal. 'H' for pilot signal.
42	REPB	O	REC/PB identification signal output. 'H' for REC state.
43	REDT	O	Record signal output.
44	TST4	I	Fixed to test terminal 'L'.
45	PD$\overline{\text{O}}$	O	RXPLL phase comparator output.
46	AMPI	I	Amplifier input.
47	AMP$\overline{\text{O}}$	O	Amplifier output, reverse output of AMPI.
48	PLCO	I	Externally-installed VCO clock input of RXPLL (512fs as reference).
49	PLVR	O	RXPLL phase comparison signal output (2fs generated from PLL clock).
50	PLRF	O	RXPLL phase comparison signal output (RX SYNC detection signal 2fs).

No.	Pin Name	I/O	Description
51	MSSL	I	Master/slave mode select. 'H' for master.
52	RX	I	Digital interface signal input.
53	VDD	–	+5V
54	TX	O	Digital interface signal output.
55	AUDR	I	Audio/data record mode select. 'H' for audio mode.
56	EXSY	I/O	External synchronizing signal input/output. Normally connected to EXSN.
57	EXSN	I/O	External synchronizing signal input/output. Normally connected to EXSY.
58	F128	I/O	256fs signal output during 128fs double speed.
59	F256	O	256fs signal output.
60	F512	O	512fs signal output.
61	ADLF	I	LSB/MSB first select input of ADDT serial data. 'H' for LSB first.
62	DALF	I	LSB/MSB first select input of DADT and DADO serial data. 'H' for LSB first.
63	XT2O	O	Crystal oscillation circuit 2 output (oscillation frequency = 22.5792MHz).
64	XT2I	I	Crystal oscillation circuit 2 input.
65	VSS	–	GND
66	XT3O	O	Crystal oscillation circuit 3 output (oscillation frequency: 49.152 MHz, 24.576MHz for half relative speed mechanical).
67	XT3I	I	Crystal oscillation circuit 3 input.
68	FSEN	I	F128, BCK, LRCK input/output select input. 'H' for output.
69	LR03	O	Reverse signal of LR02.
70	LR02	O	16BCK delay signal of LRCK.
71	LR01	O	15BCK delay signal of LRCK.
72	LRCK	I/O	2fs signal input/output during fs double speed.
73	WCK	O	4fs signal output during 2fs double speed.
74	XBCK	O	Reverse signal output of BCK.
75	BCK	I/O	128fs signal input/output during 64fs double speed.
76	ADDT	I	AD serial data output.
77	DADT	O	DA serial data output.
78	DADO	I	Digital-out audio data input (normally connected to DADT).
79	ADDI	O	Digital-in audio data output.
80	ADDN	I	Digital-in audio data input (normally connected to ADDI).
81	ERRI	I	Digital-out validity flag data input (normally connected to ERRF).
82	ERRF	O	Interpolating data/OR-NOT identification signal output of DADT data. 'H' for interpolating data.
83	MNTG	O	'H' indicates the error correction state monitor data is now output to D7 to D0.
84	D7	I/O	External RAM data input/output (MSB).
85	D6	I/O	External RAM data input/output.
86	D5	I/O	External RAM data input/output.
87	D4	I/O	External RAM data input/output.
88	D3	I/O	External RAM data input/output.
89	D2	I/O	External RAM data input/output.
90	VSS	–	GND
91	D1	I/O	External RAM data input/output.
92	D0	I/O	External RAM data input/output (LSB).
93	A00	O	External RAM data input/output.
94	A01	O	External RAM data input/output.
95	A02	O	External RAM data input/output.
96	A03	O	External RAM data input/output.
97	A04	O	External RAM data input/output.
98	A05	O	External RAM data input/output.
99	A06	O	External RAM data input/output.
100	A07	O	External RAM data input/output.

■ IC903 (CS5339) : A/D CONVERTER

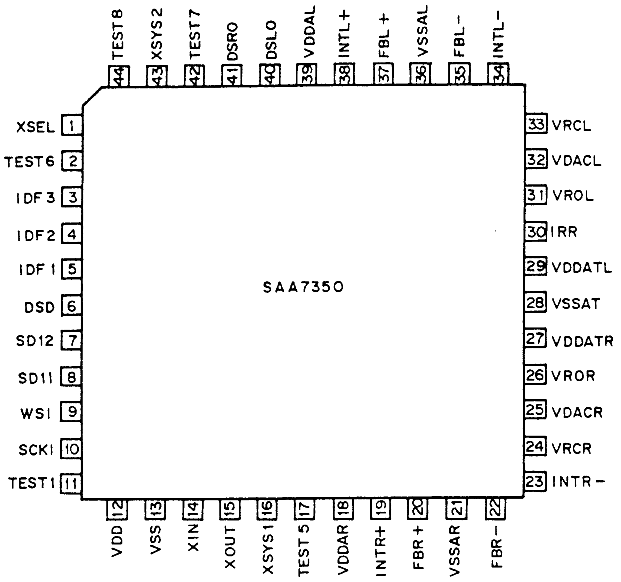
● Pin Function

No.	Pin Name	I/O	Description
1	AGND	—	Analog part. Analog ground pin.
2	AINL	I	Lch analog input pin.
3	ZEROL	I	Lch zero level input pin. The input voltage of this pin is normally used as the zero level to calibrate the Lch offset.
4	VA+	—	Analog part. Analog positive power supply pin, +5V.
5	VA−	—	Analog part. Analog negative power supply pin, −5V.
6	APD	I	Analog part. Power-down pin. "H" for power-down mode.
7	ACAL	I	Analog calibration pin. The external signal input pin is changed depending on this pin level. H : Zero level input pin (ZEROL,ZEROR) L : Analog input pin (AINL,AINR)
8	NC	—	Unconnected pin (open).
9	DCAL	O	Digital calibration pin. Indicates offset calibration in execution. Connected to ACAL pin in each part. Rises immediately when the power-down signal is input to the DPD pin, becomes "L" when 4096L/R̄ cycle (approx. 85ms when sampling frequency fs = 48kHz) has passed after the DPD pin trailing edge, and indicates the termination of the calibration.
10	DPD	I	Digital part. Power-down pin. "H" for power-down mode. Offset calibration is started from trailing edge.
11	TST	I	Test pin.
12	CMODE	I	Master clock select pin. "L" : CLK = 256fs (12.288MHz at fs = 48kHz) "H" : CLK = 384fs (18.432MHz at fs = 48kHz)
13	SMODE	I	Interface clock select pin. Sets input/output of L/R̄, SCLK, and FSYNC clock pins. L : Slave mode (all input pins) H : Master mode (all output pins)
14	L/R̄	I/O	Input channel select pin. Slave mode : Inputs fs clock. Lch MSB data is output at the leading edge and Rch MSB data is output at the trailing edge. Master mode : Outputs fs clock. SDATA is output 1SCLK later than L/R̄ edge. "H" during power-down (DPD = "H").
15	SCLK	I/O	Serial data clock pin. 1bit of output data is output at the trailing edge of this pin. Slave mode : Inputs 32fs to 64fs clock. Master mode : Outputs 64fs clock. "L" during power-down (DPD = "H")
16	SDATA	O	Serial data output pin. Data is 2's complement and is output sequentially from MSB. After 16 bits output, 3-bit over/under-scale flag and L/R̄ flag are output.
17	FSYNC	I/O	Frame synchronizing clock pin. Slave mode : Enables SDATA output when "H". Master mode : Outputs 2 fs clock. Becomes "H" during output of 16-bit data and can be used for data latch. "L" during power-down (DPD = "H").
18	VD+	—	Digital part. Power supply pin, +5V.
19	DGND	—	Digital part. Grounding pin.

No.	Pin Name	I/O	Description
20	CLK	I	Master clock input pin. CMODE = "H" : 384fs CMODE = "L" : 256fs
21	OCLK	O	128fs clock output pin. Toggles at master clock (CLK) trailing edge. "L" during power-down (DPD = "H").
22	NC	—	Unconnected pin
23	ICLK	I	128fs clock output pin. Analog part clock. Sampling rate of modulator is 64fs.
24	LGND	—	Analog part. Logic grounding pin.
25	VL+	—	Analog part. Logic power supply pin, +5V.
26	ZEROR	I	Rch zero level input pin. The input voltage of this pin is normally used as the zero level to calibrate the Rch offset.
27	AINR	I	Rch analog input pin.
28	VREF	O	Reference voltage output pin, −3.68V. The input signal full-scale depends on this voltage. FS = ±3.68V whenVREF = −3.68V.

■ IC904 (SAA7350) : D/A CONVERTER

● Pin Assignment


SAA7350
1 XSEL
2 TEST6
3 IDF3
4 IDF2
5 IDF1
6 DSD
7 SD12
8 SD11
9 WSI
10 SCKI
11 TEST1
12 VDD
13 VSS
14 XIN
15 XOUT
16 XSYS1
17 TEST5
18 VDDAR
19 INTR+
20 FBR+
21 VSSAR
22 FBR−
23 INTR−
24 VRCR
25 VDACR
26 VROR
27 VDDATR
28 VSSAT
29 VDDATL
30 IRR
31 VROL
32 VDACL
33 VRCL
34 INTL−
35 FBL−
36 VSSAL
37 FBL+
38 INTL+
39 VDDAL
40 DSLO
41 DSRO
42 TEST7
43 XSYS2
44 TEST8

● Pin Function

No.	Pin Name	Description
1	XSEL	Used for crystal oscillation frequency select and master crystal oscillation frequency. XSEL : HIGH = 384fs XSEL : LOW = 256fs XSEL is set to HIGH as a default value when not connected.
2	TEST6	Test 6 : Open this terminal.
3	IDF3	Input data format. These three terminals determine the input format. Set to HIGH as the default value when disconnected.
4	IDF2	
5	IDF1	
6	DSD	Digital mute ON/OFF change. "L" = Inoperative. "H" or "NC" = Operative.
7	SDI2	Serial data input. Used in the simultaneous mode only. Internally pulled up to "H" when unused (Rch signal).
8	SDI1	Serial data input. 16-, 18-, or 20-bit linear binary PCM signal. Used as Lch signal in the simultaneous mode.
9	WSI	Serial input word select signal. Shows the data word is for Lch or Rch. Becomes fs, 2fs, 4fs, or 8fs. Fs can be set between 16kHz and 53kHz.
10	SCKI	Serial input interface bit clock input.
11	TEST1	Test 1 : Open this terminal.
12	VDD	+5V (digital power supply).
13	VSS	GND (digital ground).
14	XIN	Crystal oscillator input.
15	XOUT	Crystal oscillator output.
16	XSYS1	Oscillator buffer output.
17	TEST5	Test 5 : Set to "L" in the normal state.
18	VDDAR	Rch analog 5V power supply.

No.	Pin Name	Description
19	INTR+	Output from Rch positive electrode switching integration capacitor. Input to the differential operation amplifier.
20	FBR+	Feedback terminal of Rch positive electrode switching integration capacitor.
21	VSSAR	Rch power supply (0V).
22	FBR−	Feedback terminal of Rch negative electrode switching integration capacitor.
23	INTR−	Output from Rch negative switching integration capacitor. Input to the differential operation amplifier.
24	VRCR	Rch high-impedance reference voltage input. Normally VDDAR/2.
25	VDACR	Rch DAC reference power supply. Normally connected to VSS.
26	VROR	Rch reference voltage output. Normally VDDAR/2.
27	VDDATR	Rch analog timing power supply (5V).
28	VSSAT	L/R analog power supply (5V).
29	VDDATL	Lch analog timing power supply (5V).
30	IRR	Reference current generation circuit 24 kohms bias resistor connection terminal.
31	VRCL	Lch reference voltage output. Normally VDDAL/2.
32	VDACL	Lch DAC reference power supply. Normally connected to VSS.
33	VRCL	Lch input and bias current generation circuit high-impedance reference voltage. Normally VDDAL/2.
34	INTL−	Output from Lch negative electrode switching integration capacitor. Input to differential operation amplifier.
35	FBL−	Feedback terminal of Lch negative electrode switching integration capacitor.
36	VSSAL	Lch power supply (0V).
37	FBL+	Feedback terminal of Lch positive electrode switching integration capacitor.
38	INTL+	Output from Lch positive electrode switching integration capacitor. Input to differential operation amplifier.
39	VDDAL	Lch analog power supply (5V).
40	DSLO	Lch digital mute operation state. "H" during digital mute.
41	DSRO	Rch digital mute operation state. "H" during digital mute.
42	TEST7	Test 7 : Open this terminal.
43	XSYS2	1/2 clock output of master clock frequency.
44	TEST8	Test 8 : Open this terminal.

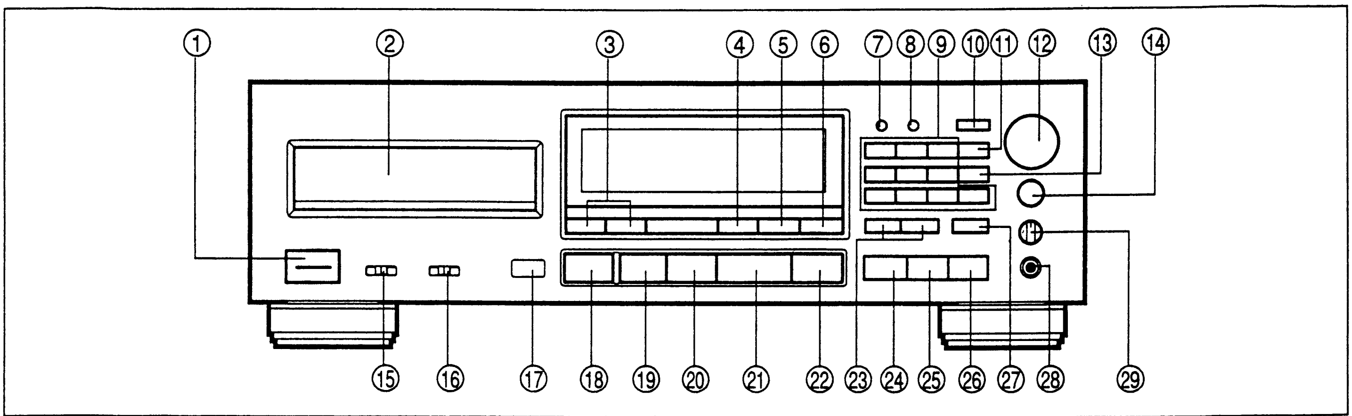
■ IC1201 (PDB030A) : MODE CONTROLLER

• Pin Function

No.	I/O	Pin Name	Description
1		VDD	Positive power supply terminal. Inputs +5V.
2	I	KSO	Key scan input terminal 0.
3	I	KS1	Key scan input terminal 1.
4	I	KS2	Key scan input terminal 2.
5	I	KS3	Key scan input terminal 3.
6	O	NC	Not used
7	O	NC	Not used
8	O	ALL	FL tube constant lighting segment output.
9	O	T8	FL tube lighting grid output
10	O	T7	FL tube lighting grid output
11	O	T6	FL tube lighting grid output
12	O	T5	FL tube lighting grid output
13	O	T4	FL tube lighting grid output
14	O	T3	FL tube lighting grid output
15	O	T2	FL tube lighting grid output
16	O	T1	FL tube lighting grid output
17	O	T0	FL tube lighting grid output
18		VPP	FL tube display power supply terminal. Supplies −30V.
19	O	S0	FL tube lighting segment output
20	O	S1	FL tube lighting segment output
21	O	S2	FL tube lighting segment output
22	O	S3	FL tube lighting segment output
23	O	S4	FL tube lighting segment output
24	O	S5	FL tube lighting segment output
25	O	S6	FL tube lighting segment output
26	O	S7	FL tube lighting segment output
27	O	S8	FL tube lighting segment output
28	O	S9	FL tube lighting segment output
29	O	S10	FL tube lighting segment output
30	O	S11	FL tube lighting segment output
31	O	S12	FL tube lighting segment output
32	O	S13	FL tube lighting segment output
33	O	S14	FL tube lighting segment output
34	O	S15	FL tube lighting segment output
35	O	NC	Not used
36	O	NC	Not used
37	O	NC	Not used
38	O	NC	Not used
39	O	NC	Not used
40	O	CCK	Clock output terminal for communications with the system control.
41	I	CDATAO	Serial data input terminal for communications with the system control.
42	O	CDATAI	Serial data output terminal for communications with the system control.
43	I/O	XRESET	System reset terminal. "L" level active.
44	I	XOPREQ	Input communication request from the system control. Communication start is triggered by the trailing edge from "H" to "L".
45	I	XRMSIG	Remote control signal input terminal.
46	I	LVDATA	Level data (serial data) from meter IC "PD2020".
47	I	LP	LP switch detection input. "H" level active. LP switch is pressed if "H" and is not pressed if "L".
48	I	RFGS	Reel FG-S (supply side) input terminal.
49	I	RFGT	Reel FG-T (take-up side) input terminal.
50	O	NC	Not used
51	O	NC	Not used
52	O	NC	Not used
53	O	XRD	Outputs the trigger for reading the level data from meter IC "PD2020".

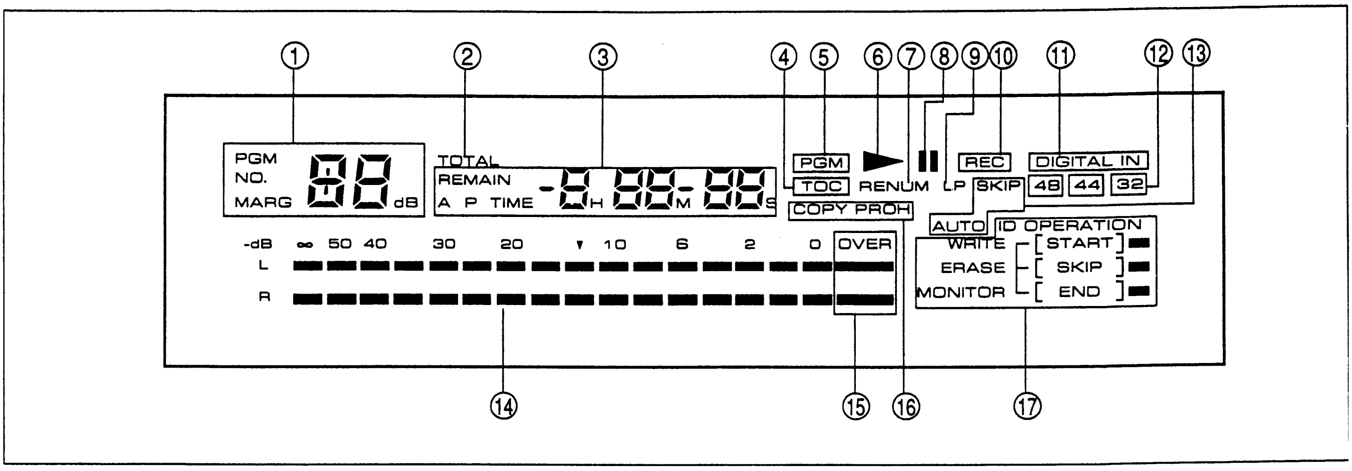
No.	I/O	Pin Name	Description
54	O	LR	PD2020 data Lch/Rch select. "L" level for Lch. "H" level for Rch.
55	O	LVCK	Clock output for serial communications with PD2020.
56	I	XTPLY	Timer play switch detection input. "L" level active. Timer play is switched on if "L" and off if "H".
57	I	XTREC	Timer recording switch detection input. "L" level active. Timer recording is switched on if "L" and off if "H".
58	I	COAX	Digital input source select switch detection input. "H" for coaxial-in and "L" for optical-in.
59	I	XANAL	Analog input switch detection input. "L" level active. "L" for analog-in and "H" for digital-in.
60			Not used. Connected to GND.
61		NC	Not used.
62		VSS	GND terminal. Connected to GND.
63		OSC2	System clock oscillation crystal/ceramic resonator connection terminal.
64		OSC1	System clock oscillation crystal/ceramic resonator connection terminal.

12. PANEL FACILITIES



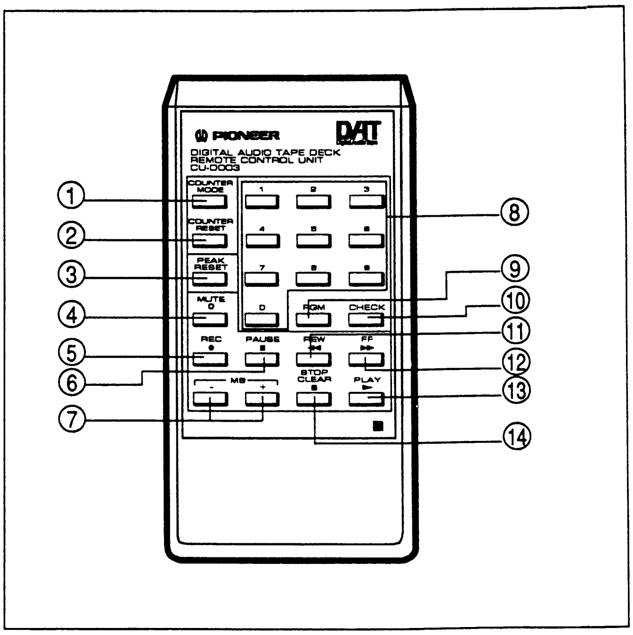
Front panel

① **POWER (▮ OFF/▬ ON) switch**
Operation of the unit becomes possible approximately 4 seconds after the power is turned on.
② **Cassette tray**
③ **COUNTER MODE, RESET buttons**
④ **ID MODE button**
⑤ **ENTER button**
⑥ **RENUMBER-TOC button**
⑦ **DISPLAY OFF button**
Press to turn off the display. The display circuit which may interfere the sound quality does not function. To turn the display back on, press this button again.
⑧ **PEAK RESET button**
⑨ **Number buttons (0-9)**
⑩ **REC MODE (▮ SP/▬ LP) button**
⑪ **PGM (Program) button**
⑫ **INPUT LEVEL control**
⑬ **CHECK button**
⑭ **INPUT BALANCE control**
⑮ **TIMER REC/PLAY, REPEAT switch**
Be sure to set this switch to OFF when not using the timer function.
⑯ **INPUT SELECTOR switch**
⑰ **Remote sensor window**
⑱ **OPEN/CLOSE button (⏏)**
⑲ **REW/REVIEW (Rewind/Review) button (◀◀)**
⑳ **STOP/CLEAR button (■)**
㉑ **PLAY button (▶)**
㉒ **FF/CUE (Fast Forward/Cue) button (▶▶)**
㉓ **Skip buttons (MS +/–)**
㉔ **REC button (●)**
㉕ **PAUSE button (❙❙)**
㉖ **MUTE button (O)**
㉗ **AUTO ID/SKIP PLAY button**
㉘ **PHONES jack**
㉙ **Headphone level adjustment control (PHONES LEVEL)**


①
②
③
④
⑤
⑥
⑦
⑧
⑨
⑩
⑪
⑫
⑬
PGM
NO.
MARG
88
dB
TOTAL
REMAIN
A P TIME
-8 88-88
H
M
S
PGM
TOC
RENUM
LP
SKIP
REC
DIGITAL IN
48
44
32
COPY PROH
AUTO
ID OPERATION
WRITE
ERASE
MONITOR
START
SKIP
END
-dB
∞
50
40
30
20
10
6
2
0
OVER
L
R
⑭
⑮
⑯
⑰

Display

① **Tune number/peak margin display**
② **TOTAL indicator**
③ **Counter indicators**
In the long play (LP) mode, absolute time (A-TIME), remaining play time (REMAIN) and total play time (TOTAL) are displayed, based on those in the standard mode. To obtain the actual time, double each value.
④ **TOC indicator**
⑤ **PGM indicator**
⑥ **Play (►) indicator**
⑦ **RENUM (renumber) indicator**
⑧ **Pause (❚❚) indicator**
⑨ **LP indicator**
⑩ **REC indicator**
⑪ **DIGITAL IN indicator**
⑫ **Sampling frequency indicator**
⑬ **AUTO ID/SKIP indicator**
⑭ **Digital-drive level meter**
⑮ **OVER level indicator**
⑯ **COPY PROH indicator**
⑰ **ID OPERATION indicators**


PIONEER
DAT
DIGITAL AUDIO TAPE DECK
REMOTE CONTROL UNIT
CU-D003
COUNTER MODE
COUNTER RESET
PEAK RESET
MUTE
1
2
3
4
5
6
7
8
9
0
PGM
CHECK
REC
PAUSE
REW
FF
MS
-
+
STOP CLEAR
PLAY
①
②
③
④
⑤
⑥
⑦
⑧
⑨
⑩
⑪
⑫
⑬
⑭

Remote Control Unit

Remote control buttons with the same names as buttons on the main unit have the same function as the corresponding buttons.

① **COUNTER MODE button**
② **COUNTER RESET button**
③ **PEAK RESET button**
④ **MUTE button (O)**
⑤ **REC button (●)**
⑥ **PAUSE button (❚❚)**
⑦ **Skip buttons (MS +/–)**
⑧ **Number buttons (0-9)**
⑨ **PGM (Program) button**
⑩ **CHECK button**
⑪ **REW (Rewind) button (◄◄)**
⑫ **FF (Fast Forward) button (►►)**
⑬ **PLAY button (►)**
⑭ **STOP/CLEAR button (■)**

13. SPECIFICATIONS

Type	Rotating head digital audio tape recorder
Tape speed	8.15 mm/sec (SP), 4.075 mm/sec (LP)
Recording time	SP: 120 minutes max. LP: 240 minutes max.
Number of channels	2 channels, stereo
Number of quantization bits	16 bits, linear 12 bits, nonlinear
Sampling frequencies (Provided SCMS)	48kHz (recording, playback) 44.1kHz (digital recording only, playback) 32kHz (SP: digital recording only, playback) 32kHz (LP: recording, playback)
Error correction method	Double encoded, Reed-Solomon code
Modulation system	8-10 conversion
Emphasis	Recording: Fixed at OFF Playback: Switched automatically
Head	AT-construction Sendust head
Recording/playback frequency response	SP: 2 Hz - 22 kHz (± 0.5 dB) LP: 2 Hz - 14.5 kHz (±0.5 dB)
Signal-to-Noise ratio	90 dB or greater
Dynamic range	90 dB or greater
Total harmonic distortion	0.0045% or less (1 kHz)
Wow and flutter	Below measurable limit (± 0.001% W.PEAK)

■ Analog Input/Output Terminals

Line input jacks	RCA PIN; reference input level 500mV (input impedance 60 kΩ)
Line output jacks	RCA PIN; reference output level 500mV (output impedance 900 Ω)
Headphone output jack	Stereo standard jack, 6 mm diameter (1.4mW volume max., load impedance 8 Ω)

■ Digital Input/Output Terminals

Coaxial input terminal	RCA PIN; 0.5 Vp-p (input impedance 75 Ω)
Coaxial output terminal	RCA PIN; 0.5 Vp-p (output impedance 75 Ω)
Optical input terminal	x 1
Optical output terminal	x 1

■ Provided Functions

- Intelligent high-speed search
- Program tune selection
- Skip tune selection and music search
- Direct tune selection
- Skip play
- Music repeat
- Random play
- Remaining amount display (automatic tape thickness calculation type)
- Cue/Review (Fine Cue/Fine Review)
- Automatic rewind
- One point memory
- Timer recording/playback
- Seven-mode counter
- Display OFF function
- SP/LP mode selection
- Digital peak margin display
- REC MUTE (automatic space creation)
- Time data recording
- Auto ID recording
- Renumbering with TOC recording
- End Mark recording, end search operation
- Wireless remote control unit

■ Power Supply and Other Specifications

Power source	AC 220 - 230 V, 50/60Hz
Power consumption	25 W
Dimensions	420 (W) x 133.5 (H) x 316.5 (D) mm
Weight	5.4 kg

■ Accessories

Wireless remote control unit	1
Remote control unit batteries (IEC R03)	2
Connection cords (RCA pin-plug, stereo)	2
Operating instructions	1
Warranty card	1

NOTE:
The specifications and design of this product are subject to change without notice, due to improvement.